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This Week

Vic software
Mike Grace looks at a selection of Vic software including Vicgammon, Mind Twisters and Pixel Power See page 12

Acorn
David Kelly talks to Chris Curry of Acorn about the future of the BBC and Electron micros on page 11

Dragon games
Keith and Steven Brain explain how to write your own games for the Dragon 32 First in a new series which starts on page 33

BBC voltmeter
Peter Donn presents a short routine for using an analogue to digital converter as a voltmeter See page 27

STAR GAME
Foxbat on ZX Spectrum by A Howes. See page 8

News Desk

Micro game makers warned

MAKERS of traditional board games are beginning to take action against companies producing computer versions of their games without permission

Until now board games represented an ideal target for software houses Conversion of a board game to a computer is comparatively straightforward and in many cases the name of the game is already established making the computer version easier to sell

But with unauthorised versions of well known board games proliferating a number of companies are trying to protect their trademarked games

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Atari 400 price cut — again

IN A renewed bid to get sales of Atari home computers moving in the UK the company has again revised its pricing

The Atari 400 machine comes down another £30 to £159 99 With the Basic Programmer Kit at £39 95 this now puts the combined cost under the £200 barrier

The price of the Atari 800 will stay at £399 95 but will be sold with an increased Ram capacity The machine will have 48K Ram as standard rather than the 16K previously offered

Both of these changes come into force on March 1

Meanwhile, the American parent company Warner Communications has announced gloomy forth quarter results Income from Warner's Consumer Electronics Division — which includes Atari US — collapsed from $136 5m for the 1981 Christmas period to only $1 2m last year This decline was due

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Classified

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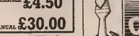


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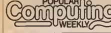
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Articles which are submitted for publication should not be more than 3 000 words long. The articles and any accompanying programs should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should whenever possible be computer printed.

We cannot guarantee to return every submitted article or program so please keep a copy. If you want to have your program returned you must include a stamped addressed envelope.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work.

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Editorial

A number of parallels have been drawn between the music business and the burgeoning software industry.

Both records and software tapes have their own Top 10 charts. Packaging and marketing "hype" is playing an increasingly important role in both fields. Individual programmers, while they have yet to attain the status of rock stars, are becoming personalities in their own right.

The two industries have moved even closer together with the announcement that Virgin Records has set up a subsidiary, Virgin Games Ltd, to produce and market its own software in the UK. Virgin boss Richard Branson has already recruited Nick Alexander from Thorn/EMI to head up the new enterprise.

The prospect of computer software being sold through record shops is increasing, particularly in view of the decision by stores such as W H Smith, John Lewis and Laskys, to stock software for the popular micros.

It remains to be seen whether or not other music publishers will follow Virgin's lead. Certainly a number of traditional book publishers are looking closely at the software market.

In the words of a best-selling pop record of recent vintage "It ain't what you do, it's the way that you do it".

Next Thursday

Who will be first to complete *The Hobbit*? Find out next week as we start a new competition for all *Hobbit* players.

Also next week, the start of a new series devoted to Adventure players — Tony Bridge's Adventure Corner. Other features next week include *Romeo and Juliet*, a mathematical adventure game for the 16K ZX81.

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	Please state machine type		

Trademark warning

Continued from page 1, col 3

TSR Hobbies has recently taken a full-page advertisement in a monthly magazine warning against producing unlicenced versions of its game *Dungeons and Dragons*. The announcement was intended as "formal notification to anyone using or intending to use any or all of TSR's trademarks that action will be taken against anyone who infringes these marks."

Dungeons and Dragons is registered world-wide as a trademark and only one company — Mattel — holds a licence to produce video games using the name.

TSR General Manager Tom Kirby explained "We have had sufficient troubles now to justify placing the advertisement — but so far most of the actions we have had to take have arisen as a result of ignorance by the infringing party. It has always been a question of drawing people's attention to the fact that *Dungeons and Dragons* is a trademark.

"We are hoping that the advert will serve to explain our position and prevent us from having to take any legal action in the future," he added. Such a public announcement creating awareness of the TSR trademark could also make any future legal action by TSR easier.

Waddingtons also is becoming concerned about the use of its names without permission. Managing director Andrew Lauder has no plans to licence any Waddington games and is on record as saying that he considers video games to be "anti-social".

Various computer versions of its board game Monopoly have appeared but in each case Waddingtons has discouraged the participants from using the word "Monopoly."

"We do not mind people having fun adapting our games for use on their home computer," said Lauder, "but anyone wanting to base video games on any of our products for commercial purposes should be warned that the games and names are protected by copyright and trademark registration."

A problem is that even successful trademark actions have only resulted in a marginal change in the title of the computer game. To make matters worse, in the US a Californian appeals court has ruled that the name "Monopoly" had become too commonplace to be protected under trademark law. The Supreme Court is currently deciding whether to overthrow that ruling.

Atari.

Continued from page 1, col 4

according to Chairman Steven Ross, to substantially lower profits from video games cartridges and losses from its coin-operated games operation. He explained that Atari was experiencing "an intensity of competition never before encountered.

"In a business where hits have become very important, Atari's new cartridge releases were disappointing relative to expectations," he said.

Added to Atari's difficulties, the US announcement of the new top-of-the-range computer, the 1200XL, has received mixed responses. Critics of the machine claim that the 1200XL does not represent a significant advance over the present 800 system.

Dot-matrix printer from Epson

EPSON has expanded its range of printers with a low-cost dot-matrix model – the RX80.

Capable of printing at 100 characters per second, the tractor-fed bi-directional printer has 6K Rom on-board and can handle two full Ascii type sets. Six printing sizes are possible. It is fitted with a Centronics interface as standard and an IEEE or RS232 interface will be available as an option. A friction-fed version of the machine is also planned – the RX-80FT.

Although no price has been fixed yet, Epson's Bob Stead expects the RX-80 to sell for around £300.

NEC launches home computer in US

NEC has announced a new home computer in the US — the PC-6000 which will sell over there for around £350.

Alan West, NEC's UK marketing manager said "We are actively looking at it — there is every possibility we will launch it in Britain this year."

The PC-6000, based on NEC's own PD780C-1 Z80 compatible chip, has a full-size keyboard, 16K Rom (expandible to 32K), 16K Ram (expandible to 32K) and runs the N60 version of Microsoft Basic. It has nine colours, and four sound channels — three music, one noise. The sound function has an eight-octave range with variable volume, it is possible to play chords and there are a number of pre-defined sound effects.

The PC-6000 is fitted with cassette interface, Centronics printer interface, two general purpose parallel ports — for joysticks or a digitiser unit — tv output, composite video output, loudspeaker output and an external bus for Rom or Ram expansion.

Mini-floppy disc drives, RS232 communications interface and 2K, 4K and 8K expansion options are available. So far in the US there are more than 50 Rom-based games cartridges on sale for the machine.

"We see the PC-6000 at the Atari rather than the Spectrum end of the market — if it goes on sale in the UK it will have a price around £400," explained Alan West.



Nick Alexander and Richard Branson of Virgin

Virgin empire moves to take in home computers

THE VIRGIN Group of Companies is expanding its record, film and book empire into the video games market.

A new subsidiary company has been set up — Virgin Games — to develop games software for the Atari, BBC, Vic20 and Commodore 64, Dragon, Oric 1, Sinclair Spectrum and TI 99/4A machines.

"In software programming as with the record business, the UK has more talent than anywhere else — and we will set up an operation to tap that talent," said Virgin Chairman Richard Branson. "In so doing we intend to take on the American market at its own game."

Nick Alexander has been recruited to organise the new company. Having been marketing manager of HMV Record Stores, Alexander went on to mastermind the launch last year of Thorn EMI's range of home computer software.

"We will bring new, aggressive, professional marketing and merchandising techniques to an industry that has yet to use them in its growth from the mail-order columns and into the high street," he commented.







The affordable FORTH

Forth. A full implementation of this very fast running language. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. 48K Spectrum only — 19.95

Chess 1.4 10 levels m/c. Graphic screen display. 16K ZX81 only — 8.95

Invaders Very fast m/c action. Includes mystery ship and increasingly difficult screens. 16K ZX81 only — 4.45

Mazeman. A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics and sound. 16K ZX81 and 16/48K Spectrum — ZX81 4.45 — 4.95

Adventure 1. Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User Iss 2. Features save game routine as the game can literally take months to complete. 16K ZX81 and 48K Spectrum — ZX81 8.95 — 9.95

ABERSOFT
7 MAES AFALLEN, BOW ST. DYFED. SY24 5BA

Communicating telepathically

I buy your magazine regularly and find it excellent value for money. However I own a BBC and my school will shortly be buying its own BBC.

I wonder why the BBC computer seems to be the poor relation in comparison with the others. As Spectrum and Dragon have their own page, why not the BBC? My Local Education Authority only recommends the BBC, not the others.

So come on *Popular Computing Weekly*, lets have more for the Beeb.

R A Smith
Headmaster
Blue Bell Junior School
Gordon Road
Nottingham NG3 2LE

You will be glad that we have just started a special page for the BBC computer. The main emphasis will be on the use of the BBC in schools — so we are hoping that all of you BBC owners will start sending in some programs which you have developed in or for school or which are in some way relevant to the use of the BBC computer in education. Start writing.

Dragooned into glory

Other Dragon tamers may be interested to learn that there is a set of 32 inverse (green on black) characters which do not seem to be accessible from the keyboard either with *Shift O* or via *Chr$*. These are the inverse numerals and most of the symbols, which could be useful when designing headings for titles.

The characters are ASCII 32 to 63, and the Dragon *Chr$* function interprets them as non-inverted. They can, however, be *Poked* to the screen memory positions 1024-1535 (which correspond to print positions 0-511), quite easily.

The following short program will reveal them in all their glory.

```
10 FOR N = 1 TO 16 PRINT NEXT
20 FOR N = 0 TO 255
30 PRINT CHR$(N)
40 NEXT
50 FOR N = 0 TO 255
60 POKE 1024+N,N
70 NEXT
80 GOTO 80
```

(Line 10 is merely to ensure that the cursor is at the bottom of the screen.)

Incidentally, for those interested in the graphics capabilities of the beast, much useful information is to be found in *Color Computer Graphics* by William Barden Jr, published by Tandy.

J I Robertson
8 Russell Way
Wootton
Bedford

Clocking up on Hungry Horace

I was very interested to read the letter from David Pountney concerning *Hungry Horace* 1, and my two children also quickly became addicted to the game. However, my 9½-year old daughter, after less than two weeks discovered the flaw in the game, and so far has a very blasé score of over 97 650 or thereabouts, it changes from day to day! My son has also "clocked" over 70,000 whilst I, needless to say, am still "nail-biting" my way to 3,000!

Despite the "head" start they now have, my children are still playing the game, but are now more interested in how many "Parkys" they can dodge in any one section of the park.

Derek Brennan
Haibre
40 Stonebridge Way
St Anne's Park
Faversham
Kent

Disservice of bad manuals

Just to add a little more weight to the many thanks that you have already received for the page devoted to the Dragon. With the features this machine has to offer at the price, it has to become a very popular computer.

My only complaint is with the pathetic manual supplied with the Dragon. Many of the examples will not run because of errors.

Manufacturers just do not seem to understand the importance of the manual. People of all ages are getting interested in computers. In many cases the quality of the manual will decide the computer they buy.

I firmly believe that hundreds of people will buy these machines and be quite unable to use them. With a lot of patience it is possible to sort things out to a certain extent, but it takes a lot of head-beating and trauma.

The *ZX81 Learning Lab* is a treasure and makes the supplied manual appear incomprehensible by comparison. The book is not much bigger than the manual, but it is written in a manner that seems to want to make things clear, instead of turning a simple explanation into a puzzle.

Let's hope your magazine gets bigger. Put up the price if you will, but let's have more.

W Slater
44 Hope Street
Brampton
Chesterfield
Derbyshire S40 1DG

There is a happy land

I am a regular subscriber to your magazine. Although I find it very good I am fed up with opening the pages and finding nothing but ZX81, Spectrum and Vic20 programs. Surely the market is already flooded with programs for these machines so how about some for the poor old Dragon 32.

S Rea
18 Bursledon Close
Felpham
Bognor Regis
W Sussex PO22 8HP

Owners of all of the popular home computers regularly write to us and complain that we only seem to publish programs for all the popular home computers, except theirs. The grass is always greener . . .

Roll up and have a shot

You have done it, you have actually published a program for the Atari 800 (*Popular Computing Weekly* Vol 2 No 4). I have every magazine of yours right from day one, as I used to have a Vic20.

Since I have now changed my computer to an Atari 800 I was pondering on the thought of cancelling my copies of *Popular Computing Weekly* (what a crime) — until a few issues back you promised to start printing Atari programs. I now intend on keeping my order of one of the best mags out for computer addicts like myself. Keep up the good work.

PS Congratulations to G C Roberts for the Maze program. It was very good and uses the Atari sound and graphics capabilities very well.

N Scott
110 Coventry Road
Bulkington
Nr Nuneaton

I am glad you liked the program. Unfortunately, we are still being sent very few Atari programs. So come on all you Atari owners, don't be shy. If you have a program that you think is worthy of publication, send it in.

Sense on royalties

On following the debate on the "Software Houses vs Software Libraries", the answer seems amazingly clear. Just come to some agreement on reasonable royalties.

It is more than obvious that libraries are so popular because renting is cheaper then buying. Also, in consequence of this, the libraries need to be bulk buyers of programs and so are a market to be considered.

Do not forget either that not everyone is rolling in money. Where someone may have the money to rent a tape does not automatically mean he will have the money to buy it instead.

Finally, experience has taught me that if a fairly expensive program is concerned, it pays to borrow it for a short time to test it. This is better than risking say £5 on something that may prove totally useless to you.

PS Let's find a compromise now, before everyone begins to suffer.

David Ward
45 Hibernia Point
Wolvercott Road
London

Coming to an agreement on royalties is easier said than done. However, we hope that we have provided a lead by refusing to accept advertisements from software libraries that hire out tapes without the publishers' permission.

Foxbat

A new game for Spectrum by A Howes

Foxbat is a fast moving graphics game for the 48K Spectrum The object of the game is to fly your plane as low as possible over the mountainous terrain which rolls across the screen The lower you fly, the more points you accumulate — but watch out for trees and steeply rising cliffs My high score is 2828, but I am sure it is possible to do better

The mountains are moved across the screen by machine code The height of the mountains is controlled by the data stored in lines 1000-2000 The user defined graphics for the planes and trees are contained in lines 2010-2020

The *In* statement has been used instead of *Inkey$* as this allows two keys to be read at the same time

The control keys are Z (left) X (right), P (up) and L (down)

First enter the main program then type

```
Save  Firefox  Line 1
New
```

Next, type in program two and Run it The machine code should then be entered byte by byte This should be saved directly after the main program, which will load it automatically ■

```
1 PAPER 0: INK 7: CLS : BORDE
R 5
9 CLEAR 65099: LET ss=0: LOAD
""CODE 65100
3 GO TO 2000
4 LET s=0
5 LET fy=0: LET fx=0
6 LET b=0: LET by=0: LET bx=0
10 FOR n=18 TO 21: PRINT AT n,
0; PAPER 5; INK 5,"
                    ": NEXT n
20 LET f=0: LET x=10: LET y=7
30 PRINT AT 21,11; INK 0; PAPE
R 6;"FIREFOX";AT 19,11;"SCORE ";
s;AT 17,11;"HI SCORE ";ss
100 FOR z=1 TO 269
110 READ n
120 POKE 65190,n
130 LET s=s+y
135 PRINT PAPER 6; INK 1;AT 19,
17;s
140 LET l=USR 65100
150 LET y=y+(IN 49150=253)-(IN
57342=254)
155 LET x=x+(IN 65278=251)-(IN
65278=253)
167 IF x<0 THEN LET x=0
168 IF y<0 THEN LET y=0
169 IF ATTR (y,x)<>7 OR ATTR (y
,x+1)<>7 THEN LET k=1: FOR n=1 T
O 20: LET k=-k: BEEP .15,n*k: NE
XT n: GO TO 3000
170 PRINT AT y,x; INK 7; BRIGHT
 1;"▲"
172 IF n=7 THEN PRINT INK 4;AT
18-n,31;"♠"
173 FOR d=1 TO 2: NEXT d
174 PRINT AT y,x;"  "
176 NEXT z
178 PRINT AT 10,0;"MISSION COMP
LETE": GO TO 3000
980 RESTORE : GO TO 100
1000 DATA 1,1,1,1,1,1,1,1,1,1,1,
1,1,1,1,1,1,2,3,4,5,6,7,8,9,
11,12,13,14,13,12,11,10,9,9,9
,9,9,9
1010 DATA 9,9,9,9,9,9,9,9,10,10,
11,10,9,8,7,6,6,3,2,2,3,4,3,1
,3,4,6,8,7,6
1020 DATA 7,6,5,4,3,2,1,1,1,1,1,
1,2,2,2,2,3,4,4,3,3,3,3,3,4,4,
5,5,5,5,5,5,5,5,5,5,5,5,4,6,
6,6,6,7,7,7,7,7
1030 DATA 9,9,9,9,9,9,9,10,11,12
,13,14,15,15,15,15,14,14,13,13,1
2,11,11,11,11,9,7,5,3,4,5,6,7
1040 DATA 9,11,13,15,16,16,16,16
,14,14,14,14,14,14,14,16,16,1
4,12,11,9,7,5,3,1,1,3,3,5,6,8,9,
11
1050 DATA 6,8,4,2,2,1,1,1,1,1,1,
1,1,3,9,12,14,16,16,16,16,16,16,
15,15,16,16,16,15,16,15,15,16,13
,13,13,13,13,13,14,13,12,10,9,6
,6,5,4,3,3,2,1,1,1,1,1,3,3,4,2
,1
1070 DATA 1,1,1,1,1,1,1,1,1,1,1,
1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
1,1
1980 RESTORE 2000
2010 DATA BIN 00001000,BIN 00001
000,BIN 00011100,BIN 00111110,BI
N 00111110,BIN 01111111,BIN 0110
1011,BIN 00001000: FOR n=0 TO 7:
 READ r: POKE USR "♠"+n,r: NEXT
n
2015 DATA BIN 0,BIN 00000,BIN 11
110000,BIN 11111000,BIN 11111111
,BIN 00011111,BIN 00000111,BIN 0
0001111: FOR n=0 TO 7: READ r: P
OKE USR "▲"+n,r: NEXT n
2016 DATA BIN 0,BIN 0000,BIN 00,
BIN 0,BIN 11110000,BIN 11111000,
BIN 11111111,BIN 0000: FOR n=0 T
O 7: READ r: POKE USR "▲"+n,r: N
EXT n
2020 RESTORE
2025 CLS
2030 PRINT AT 5,12;"FIREFOX",AT
21,0;"© A.Howes"
2040 INPUT "Start ?",s$
2050 GO TO 4
3000 RESTORE : INPUT ("You score
d ";s;" Another game ?");s$
3010 IF s>ss THEN LET ss=s
3015 CLS
3020 PRINT AT 17,20;ss
3050 IF s$(1)="n" THEN STOP
3060 GO TO 4
```

MACHINE CODE

17	0	00	1	255	1
33	1	00	237	176	1
39	16	33	255	63	17
254	63	237	176	22	128
62	0	33	31	64	1
32	0	54	0	0	9
21	166	40	2	94	246
62	7	50	31	65	50
63	00	50	95	00	50
197	65	50	159	65	50
191	65	60	223	66	50
255	66	50	31	69	50
63	69	50	95	69	50
127	69	50	159	69	50
191	69	60	223	69	22
1	62	0	33	31	90
1	39	0	64	45	0
190	0	237	66	21	186
40	9	24	243	201	0

(The second byte is 0 !!!)

program 2

```
10 CLEAR 65099
20 LET a=65100
30 FOR n=1 TO 114
40 INPUT b
50 POKE a,b
60 LET a=a+1
70 NEXT n
80 INPUT "Are you ready to sav
e machine code ,after FIREFOX
(y)",s$
90 IF s$="" THEN GO TO 80
100 SAVE "hang on.."CODE 65100,
120
```

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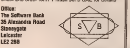
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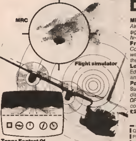
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Waiting for Electron

***David Kelly** talks to Chris Curry of Acorn about the BBC and Electron micros*

With Acorn poised to launch its BBC micro in the US (*Popular Computing Weekly* November 4) and with orders still flowing in the UK, the future looks bright for managing director Chris Curry

One of the most encouraging things for Curry has been the take-up figures for the BBC machine in the Department of Industry's Micros in Primaries Scheme — almost 80 percent.

"Whatever the reasons, I think that there is every chance that the BBC machine will become the standard in schools

"The number of machines being bought by individuals for use in the home has surprised us We never expected the BBC machine to compete with the Spectrum first time round, but people who want something better than the Spectrum are turning to the BBC"

When Acorn's new micro, the Electron, makes its debut at the end of March, it will coincide with major product launches for the BBC machine "There is an awful lot of stuff coming out at the same time — that's not the way we originally planned it, but there you are" smiles Curry wryly

"As the Electron comes in at the low-cost end of the market so the BBC will move up with a range of business software and second processors

"When we launch the Z80 processor in April it will be fully supported by a range of CP/M Z80 Basic business software from Acornsoft

"For the 16032 processor one of the systems we are working on will be a network-type system giving a number of machines time-shared access to the 16032


Chris Curry Acorn's Managing Director

"We are also very interested in the microcomputer/video disc combination. There are a lot of companies waiting in the wings to do material for it

"A rudimentary system was on display at the BBC's World Trade Centre Show but the finished product will be capable of much more than that The problem at the moment is that the bit drop-out rate is quite high for video discs Techniques will have to be improved dramatically before such a disc can be used for data-base storage "

With the UK side of BBC sales sorted out now — and the embarrassing order backlog cleared — Acorn has been looking around for other markets For several months now BBC machines manufactured in Hong Kong have been on sale in Australia and South Africa Acorn has also opened a branch office in Germany which will distribute the micros to most of Europe

By late April, the NTSC (US colour tv system) version should be on sale in America "In the US the price-war between Texas Instruments and Atari is vicious but surprisingly we find we are not price sensitive The only machine which comes close to offering the same sort of performance in the US is the Commodore 64

"We will be selling the all-singing all-dancing, model B for around $800 (about £520) and we have just spent $1¼m putting the BBC Computer Programme on Public Broadcast Service tv over there"

Right now Acorn is very keen to hear from any company making any sort of material — hardware or software — for the BBC machine "We will promote it over there at the same time as the computer," says Curry

The Electron is, as far as the software is concerned, almost identical to the BBC machine both use the same version of BBC Basic and any programs written in Basic for the BBC will run on the Electron Tapes, however, will not run directly because of differing input/output systems The only thing missing on the Electron is Mode 7 — the Teletext mode All the other display formats are possible, including the highest resolution mode

Hardware for the Electron is completely different "It has only cassette tv and RGB monitor interfaces together with an expansion bus If you want to connect anything else you will have to buy from a range of add-ons modules to connect discs (it uses the same disc interface as the BBC), RS232 and IEEE interfaces Econet connector and a light-pen module

"The real intention of the Electron is to provide a low starting point — the standard 32K model will cost £150 excluding VAT There is no compromise on quality either — the keyboard, for example is the same as the one on the BBC "

The Electron will be manufactured in Singapore "One reason is that the duty on components in the UK is thoroughly unacceptable — notwithstanding the fact that overseas suppliers have to a certain extent adjusted their prices to take account of it.

"But the main reason we will be manufacturing the Electron overseas is that we wanted to apply some fairly radical production techniques We find there is less resistance to change in countries like Hong Kong and Singapore — they go straight in with capital expenditure on new equipment — automated component insertion tools, bonding equipment and the like British companies find this difficult to do and there wasn't anyone in the UK who was already set up for it We would obviously prefer to be manufacturing in the UK, but the first run, at least, will be in Singapore

"We will not do any advertising until we are *completely* confident that stocks are available More than almost anybody else we have suffered in the past from problems of lack of product when the demand is high And we are not going to let it happen again"

With the Electron Acorn has chosen what is becoming the most competitive sector of the market — one in which new machines seem to be launched almost every week

"Computer brands will appear and disappear in the coming months — it would be wise to go for a company that is here to stay," offers Curry confidently ■

Mind twisters and more

***Mike Grace** turns home doctor in an attempt to find out what the Vic20 can actually do.*



One of the main advantages of a computer (so the sales blurb tells you before you buy the thing), is the tremendous versatility of the machine It seems that there is almost no end to the possibilities and people who are 'into computers (excuse the phrase) are forever extolling the fact that there are really no limits to their capabilities But having bought one and played around with it for a little while it s surprising how difficult it is to explain to a relative or friend just what it can do "Yes dear it s all very nice says a favourite aunt but what does it *do*?

This latest batch of software I received for the Vic goes some way towards answering that question because it is a blend of assorted software — a pot pourri of possible applications for a home computer

Let s start with the simplest application — games I know games are old hat to many people but they probably form the mainstay of home computing software Many of them really are fun and some of them help beginners to learn how to program

The first tape is a compilation tape from Impact Software containing four programs Compilation tapes usually spell 'danger to me because I suspect that none of the games will be of a high standard, but I was proved wrong on this one The first game on one side — *Alien* — was indeed rubbish, but the second game — *Roadrace* — proved to be surprisingly simple in concept yet extremely addictive *Alien* is yet another poor man s *Invaders* with nil graphics and very slow action, but might well appeal to 3-5 year olds

Roadrace is a mix of *Pacman* and a maze program with simple yet effective graphics (and can be used with either a joystick or keyboard) A simple maze appears and the letter *H* (your enemy) moves along it, leaving behind little dots in its wake and changing course at random Your task is to pick a course in the maze that allows you to eat up the dots (as in *Pacman*), but avoiding the *H* in your travels as it will obliterate you This is not as easy as it sounds as *H* can suddenly switch lanes on you and once you are in the maze you cannot reverse

The game sounds too simple to be fun and the first few times I played it I almost gave up but as I began to pick up the game so I picked up interest. After an hour I was as keen as before and still trying in vain to beat an earlier score

On the other side of the tape are two more games Again one I found not much value but the other — *Pontoon* — is the traditional card game and I found it completely addictive The computer is the bank and deals out cards at random (one of the advantages of Vic graphics here is the use of the traditional playing card symbols to add authenticity) You have 100 chips to start with — careful playing plus a touch of luck can make this game last a long time

The next tape is another compilation for the unexpanded Vic from Romik Software but this time it is a real gem All four programs are very good indeed perhaps because they are based on traditional games The games are *Blackjack* (similar to pontoon but with better graphics) *Decipher* which is really *Mastermind*, *Four Thought* which is a computer version of *Four in a row* where you have to beat the machine to get your four colours in a horizontal, vertical or diagonal row, and *Tesser* The last game is the weakest of the bunch, but requires a lot of skill and 'thought' as you try to beat the Vic in selecting three numbers to total 15

In all four games a lot of care and thought has gone into presentation — the instructions appear and disappear while colours and flashing screen borders add to the interest The quartet has a professional feel to it sorely lacking in many other examples, and at virtually £10 I reckon it is excellent value

Speaking of value I had the feel as I was reviewing this collection of tapes that computer versions of traditional games (chess backgammon, pontoon, Mastermind etc) are perhaps better than the arcade games This is because most games already have a history of being playable and the novelty of the pure video game does wear a little thin after a while Besides that there is the element of trying to beat the machine made all the more enjoyable when you win Perhaps it s because I feel the machine is superior to me in assessing moves estimating gambles etc So when I win I feel I have really beaten a superior being while at the same time no-one has had to lose (no-one human that is) Food for thought!

Continuing with the games theme I tried *Vicgammon*, the Bugbyte version of *Backgammon* which is for the expanded Vic (3K or more) Luckily I already knew how to play as no instructions were given But, apart from this I found the game very enjoyable and the graphics well suited to the game My only criticism is that when coming off the bar I had no choice as to which die I picked (the computer would only let me use the top die) but apart from this the game was very true to reality (and I almost won as well!) This is the best game from Bugbyte I have tried and well worth the £7 00 price which includes post and packing

Finally in the games section are two extremely good and highly annoying games from Pixel *Harvester* and *Brainstorm* at £7 95 for the pair *Harvester* is a board game for two players Each may draw straight lines on a board in an attempt to trap the other player who cannot cross the line My explanation is poor because I cannot put this game easily into words but it is a good game and reasonably original

Brainstorm is the better of the two in that I cannot do it (Lord knows I ve tried) and involves a kind of teaser game relying on thought alone Basically there are three humans and three aliens on one side of a river All six need to get to the other side

Firm	Program	Cost	Value (1-10)
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Romik 24 Church Street Slough SL1 1PT	*Multisound Synthesizer* *Mind Twisters*	£9 99 £9 99	8 8
Eastmead Computer Systems Ltd Eastmead House Lyon Way Camberley Surrey GU16 5E2	*Basic Medicine* *How Healthy Are You*	£6 75 £9 75	3 3
Impact Software 70 Redford Avenue Edinburgh EH13 0BW	*Games Pack*	£5 00	5
Pixel Productions 92 Northam Road Southampton SO2 0PB	*Harvester and Brainstorm* *Pixel Power*	£7 95 £7 95	7 10



but the boat will only carry two at a time. The snag is that if two aliens are ever on one bank with only one human (or three aliens with two humans) then the telepathic waves from the aliens give the humans a brainstorm and the game is over. Well you can guess the sort of thing! After many hours I still have not worked it out.

I started this review by talking about some of the other applications of the microcomputer, so let's move to a different type of program. Eastmead Computer Systems recently introduced a range of medical topics under the title *"The Home Doctor Series"*. These programs are designed to help the general public educate themselves on such matters as *Basic Medicine*, *How Healthy Are You* (the two I had to review) and other topics such as *101 Nursing Tips*, *All About Children*, *Mainly for Men* and *Mainly for Women*.

Eastmead Systems make the point that the programs in no way replace the professional medical specialist, but complement them by giving people a better idea of how to cope with medical matters themselves. This is indeed a laudable project, as ignorance often breeds worry and fear. The only problem with this type of information is that a little knowledge can be a dangerous thing. But, the program sensibly covers that point by running through a series of basic questions (such as have you noticed any lumps or swellings grow in size or start bleeding — do you take any home medicines regularly, etc) and advising the person to take medical advice if the answer to any of these is *yes*.

Does the idea work? Well, for *Basic Medicine* the answer is definitely no — not because of any basic fault in the factual content or the presentation, but because of the medium. I find it hard to justify the use of a microcomputer to either give simple basic advice on the best way to cope with scalds or burns (a book would be better), and the sections on what to do in the case of an accident, while being good fun for a first aid revision, are hardly the way to deal with a real emergency. I have this picture of Mum rushing to the Vic after her baby has fallen from the tree, to sit waiting for the cassette to *Load* (quite a long time as this program needs 8K) and then being asked if he has bleeding that won't stop. Upon answering *yes*, she is advised to take him to hospital. It just doesn't seem to me to be the right way of passing on that sort of information, however accurate and however important.

The other problem with this type of program is that, to ensure it is not misused, the programmer (or his medical adviser) must be cautious and err on the side of safety. This leads, for example, in the section on headaches to possible diagnoses of high blood pressure, eyestrain, sinusitis, glaucoma, etc, which could all cause some distress to the uninitiated person with a case of tension headache. Now I know it is best that the patient seeks his doctor, but as most people are not capable of self-diagnosis I suspect this type of sound advice could be misinterpreted.

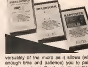
This is, I suspect, one of the main problems with computer software. Can there really be an advantage in presenting chunks of basic information on a screen? After all, the rapid decline of paper that is still being predicted seems to be as far away as ever (you are, let's face it, reading a magazine at the moment). And when you get down to hard facts, this program at £6.75 gives very poor value for money as compared with a popular medical book at the same price.

At first I thought the second program from Eastmead Systems might have been better suited to the medium of the micro — but alas no. The concept of health care in multiple choice should have lent itself better to micros — but when I began to view the programs on smoking, dieting, exercise, coping with stress and the other valuable topics, again I was faced with very few facts (correct but lacking in style, imagination and depth) and it was easily possible to 'beat the system'. For example, on answering the section on smoking (I do not smoke by the way) I truthfully keyed in all the correct answers to all the questions and was faced with exactly the same response as if I had been a smoker — ie the program advised me I was smoking too much and needed to cut down. Now while this information is good common sense — the fact that I was able to get this response when I answered as if I did *not* smoke to me invalidates the whole program.

While I do know something about medicine and computers, one of my greatest regrets is not being able to play a musical instrument, so it was with a mixture of anticipation and hope that I approached the *Vic Multisound Synthesizer* for the unexpanded Vic from Romik Software. This is an extremely versatile piece of software on cassette which allows me to convert my Vic into a composer's aid.

Upon *Loading*, the screen flashes with colour and sound and I have the choice of four modes (selected by pressing the F1-F7 function keys) which allow me to compose music, retain it in memory to be replayed at the touch of a key, or saved on tape, and with the option of a background drumbeat. There are numerous extra functions which include items such as decay, increase or decrease the rhythm, raise or lower octaves, and still other things that I have yet to discover. As my knowledge of musical terms is zero, I have not yet been able to extract the full versatility of this cassette, but it is really fun learning. Compared with the Medical tapes I reviewed earlier, this cassette at £10.00 seems an incredible bargain.

The final tape for review is another from Pixel Productions which, like the *Multisound Synthesizer*, expands the capabilities of the Vic (and the imagination of the user) considerably. Called *Pixel Power*, it is a method of allowing the character set to be changed with amazing simplicity. I have often looked at programs in magazines which purport to let me generate my own characters, and after a lot of head-scratching and mind-blowing I have elected to "leave it for another day" as I cannot quite seem to be able to work out what it's all about. Anyone else like that will find this cassette a boon — and also will find out how much more fun computers can be. Again this is a real example of the



versatility of the micro as it allows (with enough time and patience) you to paint pictures, write in Greek, or do anything with graphics that you feel like doing.

Upon *Loading*, you are faced with a menu which allows you to either view the existing characters or draw your own. Drawing your own characters is simplified by an 8x8 grid. Moving the cursor around the grid and pressing '1' to mark that section of the grid will allow a character to be drawn. Once completed, the character can replace any character on the keyboard, either in normal or reverse mode, and can be changed again easily if it is not suitable.

A further option allows you to build up larger blocks by using the smaller characters or the existing graphics. In fact there is a vast amount of scope with this program. Some of the nicer points about this cassette (a feature Pixel Productions excel in) is the neat instruction booklet accompanying the cassette and the professional layout of the screen during running the program.

I really can recommend this cassette, even to non-technical types like me who might be afraid it is a little too difficult for them to cope with. I have had lots of fun with this one and again the price of £7.95 seems exceptional when compared with some of the software around.

So to conclude this excursion into the realms of computer versatility and to help answer the question "But what does it *do*?" I have covered several different aspects of some of the better Vic software I have seen. As in all walks of life, the Vic buyer seems to be at the mercy of the sales pitch and software is not always 'better if you pay more'. ■

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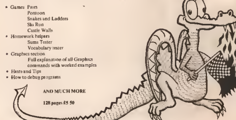
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Compiler

on ZX81

The following article develops and explains a 1K program which instantly and effectively translates a good subset of ZX81 Basic into machine code.

Many ZX81 owners would like to learn machine code but find it too difficult or don't have the time. Most ZX81 compilers are expensive and require 16K. My program only needs 1K to run and offers a real alternative to these people.

Type in the following

```
10 INPUT R$
20 IF LEN R$ > VAL "4" THEN LET A = (CODE R$(VAL "5") - CODE "8") * VAL "2"
30 IF LEN R$ > VAL "11" THEN IF R$(CODE "£") = "$" THEN PRINT "D9CD0B02444D511428F7CD8D077ED94F575F676F" (A TO A + SGN PI)
37 IF R$(SGN PI) = "F" THEN PRINT "06" R$(CODE "£") (D)
39 IF R$(SGN PI) = "L" AND LEN R$ < VAL "9" THEN PRINT "0E181E282E" (A TO A + SGN PI) R$(VAL "7" TO VAL "8") (D)
40 IF R$(SGN PI) = "L" AND LEN R$ > VAL "9" THEN PRINT ("0C141C242C" (A TO A + SGN PI) AND R$(VAL "8") = "+") ("0D151D252D" (A TO A + SGN PI) AND R$(VAL "8") = "-")
45 IF R$(SGN PI) = "G" THEN PRINT "18XX"
50 PRINT ("CF" AND R$(PI) = "9") ("C7" AND R$(PI) = "W") ("CD0E0C" AND R$(VAL "2") = "C")
60 IF LEN R$ > VAL "4" THEN IF R$(SGN PI) = "I" THEN PRINT "3E" R$(VAL "7" TO VAL "8") "B8BABBBCBD" (A TO A + SGN PI) "20XX"
70 IF NOT R$(SGN PI) = "P" THEN GOTO VAL "10"
80 FOR N = SGN PI TO LEN R$ - VAL "8"
90 PRINT "3E" CODE R$(VAL "7" + N) (D)D7
100 NEXT N
110 GOTO VAL "10"
```

In order to make this program fit into 1K I've used every space saving trick I know, ie using the *Val* function and *Pi* for numbers. Also instead of using

```
IF R$(PI) = "9" THEN PRINT "CF"
IF R$(PI) = "W" THEN PRINT "C7"
IF R$(VAL "2") = "C" THEN PRINT "CD0E0C"
```

mould them all together and get

```
PRINT ("CF" AND R$(PI) = "9") ("C7" AND R$(PI) = "W") ("CD0E0C" AND R$(VAL "2") = "C")
```

When typing in some of the longer lines it might help to clear the screen before entering them. The same thing applies when you want to edit a line and the ZX81 won't let you. Simply clear the screen (*Cls*) press *Edit* and there's your line.

Run the program. You should be faced with a string input. You must follow the instructions very carefully.

The translator will convert the following commands into machine code

```
LET PRINT "string" FOR-NEXT IF THEN INKEY$ GOTO SCROLL STOP NEW
```

You must remember that there are no strings in machine code. A$, B$, C$ don't exist. The only variables you may use are C, D, E, F and G. The next thing is very important: you must type out all commands and functions letter for letter including spaces. LET C = 45 would consist of eight separate characters.

When using conditional statements the *If* part must be followed by two spaces. The *If* statement can only compare a variable with a number and not a variable with another variable. Another restriction of conditional statements is that the *Then* must always be followed by a *Goto*. This is a restriction of machine code and not my program.

You may only add or subtract 1 from a variable. If you wish to subtract or add more you must use that number of +1 or −1 statements. *Print* may only be used in the form *Print* "string" not *Print At*, *Tab* or *Print* C, D, E, F, G.

Inkey$ may only be used in the format *Let* X = *Inkey$* (where X is either C, D, E, F or G). Note *Inkey$* returns the code of the key pressed.

There are no line numbers in machine code so enter your statement as if it was a direct command. This poses a problem when it comes to commands like *Goto* and *Next* and you will find my program prints two X's whenever these commands are used. You will have to work out what goes there yourself but it's really very easy. In machine code the only *Goto* instructions are *Goforwards* and *Gobackwards*. You will have to count the number of places it takes to get from the two X's to where you want to go.

Here is an example

Basic	M c
FOR C = 1 TO 8	0E 08
PRINT "A"	3E 26 D7
NEXT C	10 XX

In this case it takes 4 steps backwards (−4) to get from XX (end of *Next* C) to 3E (beginning of *Print* "A"). Look up −4 in the following table and replace XX with FB.

−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	−11
FE	FD	FC	FB	FA	F9	F8	F7	F6	F5	F4

To go forwards use the following table

+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11
00	01	02	03	04	05	06	07	08	09	0A

If you find a D in brackets after a number it means that number is in decimal and you will have to look up the hex equivalent in the back of your ZX manual. Regarding all commands, make your program as simple as possible: complicated lines will not be translated properly. Always include a C9 instruction at the end of any M c program.

by Robin Wright

AV Timer

on Vic-20

An interesting conclusion I have come to having owned a computer for about eight months is that there are quite a lot of people who are into computers who are also keen on photography.

I have been using the new type of chromogenic film (dye based instead of the old silver based film, a sort of black and white colour film) for about two years. As with temperature control the timing of the development of this film has to be much more accurate. The program started simply as an exercise in handling strings and ended up as a very useful audio/visual timer to help processing films. It is also interesting to note that given the right peripherals this same program could be adapted to do the whole job itself.

Program notes

Line 30 — sets the volume and notes used for the audible warning

Line 80 — gives me time to get downstairs to where I develop the films. Alter this if you don't want a time delay. It also starts the clock at zero

Lines 100 to 152 get the different parts of TI$ which represent minutes and seconds

Lines 160 to 260 produce the value of the time in simple numeric form and then direct the program to subroutines which sound at the start, and then at each minute and half minute, and at the times when developer must be tipped out and bleach-fix put in

Line 270 simply slows down the program so that the flickering is not too noticeable

Lines 290 on are the subroutines which sound on each minute etc

```
10 REM TIMER PROGRAM
20 REM GEOFF CROWTHER  JAN 1983
30 V=36878 P=36875 W=36876
40 PRINT"■■■■■     XP1   TIMER      ■"
50 PRINT"■■■■■■ YOU NOW HAVE A"
60 PRINT"■  FEW SECONDS TO GET"
70 PRINT"■ DOWNSTAIRS AND START"
80 PRINT"■■■  START ON THE TONE"
   FORI=1TO10000 NEXTI TI$="000000"
90 REM STRING WORK
100 X$=RIGHT$(TI$,4)
110 Y$=LEFT$(X$ 2)
120 PRINT"■■■■"
130 PRINT"■■■■■" Y$," MINUTES"
140 Z$=RIGHT$(X$ 2)
150 PRINT"■■■■■",Z$," SECONDS"
160 A=VAL(Y$)
170 B=VAL(Z$)
180 S$=RIGHT$(Y$,1)
190 C=VAL(S$)
200 IFA=10THENGOSUB320 END
210 IFC=0ANDB<5THENGOTO290
220 IFC=5ANDB<5THENGOTO290
230 IFA=4ANDB=45THENGOSUB320
240 IFA=9ANDB=45THENGOSUB320
250 IFB=0THENGOSUB350
260 IFB=30THENGOSUB350
270 FORI=1TO660 NEXTI
280 GOTO100
290 POKEV,0
```

Turn to page 19

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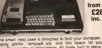
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From page 15

```
300 FOR1=1TO50 POKEP,240 NEXTI POKEV 0
    POKEP 0
310 GOTO270
320 POKEV,15
330 FOR1=159TO255STEP5 POKEW,I FORJ=1TO50
NEXTJ NEXTI POKEV,2 POKEV 0
340 RETURN
350 POKEV 0
360 FORL=1TOM POKEP 240 FOR1=1TO100 NEXT1
370 POKEP 0 FOR1=1TO100 NEXT1
380 NEXTL POKEV,0 POKEP,0
390 RETURN

READY
```

A/V Timer
by Geoff Crowther

Tape Decode

on Spectrum

This short program will 'decode' the tape header used by the ZX Spectrum when loading programs from tape I wrote the program so that unnamed or "secretly" saved programs may be loaded and listed The program also determines the auto-start line number It will run on 16K or 48K Spectrums All the information required by the computer during loading is stored in a 'header' which has 17 bytes and is audible after about 5 seconds

The header contains the following information

1) The type of program on tape ie Basic or machine code etc
2) The 10 character filename
3) The length in bytes of machine code (If Basic then the length plus variables.)
4) The Basic auto-run line number of a program or the first location of any machine code
5) The length of Basic program

The program *Pokes* a small machine code routine into memory which loads 20 bytes from tape by calling the load routine at 0556 (Hex) with the number of bytes to be loaded in the DE register pair The bytes are then decoded by the rest of the program

A disassembled version of the routine is included This routine sets the carry flag for loading, then sets the A register to 00 This means load A code block sets the instruction register (IX) to 7D00 (Hex) as destination for the bytes from tape, sets DE with the number of bytes to be loaded then calls the load routine and then returns to Basic

The program runs continuously and decodes any header it encounters and could be relocated above ramtop and called when required

Title Scrolling

On Spectrum

Program two is an interesting little routine to liven up games titles while you are reading the instructions. It plays with the *Chars* pointer value and rolls titles over and over themselves

Program three stores an inverted not inverse character set in Ram Do not be afraid to experiment with the contents of the addresses in chapter 25 of the manual but not when you have a prog-ram you want in the memory — just in case you do crash your machine.

```
10 F N n   TO 4  POKE 23608 n
20 PRINT AT 10,10 "free so til
l"
30 PAUSE 5  NEXT n
40 FOR n=7 TO 0 STEP -1  POKE
23608,n
50 PRINT AT 10 10 "screws til
l"
60 NEXT n  GO TO 10
```

Title Scrolling
by Chris Wood

Character Set

On Dragon

The listing shown below will display all of the characters available to the Dragon user via *CHR$* Careful examination of the screen will reveal that out of a possible 256 characters we only get 224 In fact the Dragon Manual lists only these same 224 characters

```
10 CLS
20 FOR I = 0 TO 255
30 PRINT @ I CHR$(I)
40 NEXT I
50 GOTO 50
```

How then can we rectify this loss, and indeed what are we losing? If we again look carefully at the display, we will see that in the inverse video mode (green on black) only the letters and a few of the characters are present Indeed there is not even a black space to use with the letters and CHR$(128) tends to give a deeper black

The answer is simply to *Poke* the characters to the screen Enter line 35 below and re-run the program to see the full set that each approach will produce

```
35 POKE 1280 + I I
```

by Kevin Thomas

```
  1 BORDER 1  PAPER 1  INK 0, C
LS
  5 PRINT AT 2,0, "MACHINE CODE
",AT 3,0 "HEADER DISASSEMBLER ,A
T 6,0 "© MJS DEC 1982"
  6 PRINT AT 6,0, "START THE TAP
E NOW",AT 7,0, "THEN HIT A KEY"
  8 PAUSE 0
 10 CLEAR 32767
 15 FOR L=32768 TO 32783
 20 READ M  POKE L,M
 25 DATA 55,62 0,221,33,0,125,1
7,20 0,205,86,5,201
 60 PRINT AT 14,0, "LOADING HEAD
ER",AT 15 10, "PLEASE WAIT",AT 10
0, "PRESS BREAK TO STOP"
 70 RANDOMIZE USR 32768
 80 CLS   PRINT AT 0,10, "HEADER
DATA"
 88 PRINT AT 2,0, "DATA ID
 90 PRINT AT 4,0, "FILENAME
 91 IF PEEK 32000=0 THEN PRINT
AT 2,10 "BASIC"
 92 IF PEEK 32000=1 THEN PRINT
AT 2,10 "NUMERIC ARRAY"
 93 IF PEEK 32000=2 THEN PRINT
AT 2,10, "CHARACTER ARRAY"
 94 IF PEEK 32000=3 THEN PRINT
AT 2,10, "CODE BYTES"
101 PRINT AT 4,10,
109 FOR B=32001 TO 32010
115 PRINT CHR$ (PEEK B);
120 NEXT B
```

```
120 LET A=PEEK 32011  LET B=PEE
K 32012
125 LET N=A+(B*256)
130 LET A=PEEK 32013  LET B=PEE
K 32014
135 LET M=A+(B*256)
140 LET A=PEEK 32015  LET B=PEE
K 32016
145 LET O=A+(B*256)
160 PRINT AT 8,0, "CODE LENGTH "
,AT 8,10,N
180 PRINT AT 9,0,"START CODE ",
AT 9,10,M
190 IF PEEK 32000=0 THEN PRINT
AT 8,0 "START LINE"
370 PRINT AT 10,0 "BASIC LENGTH
",AT 10,10,O,AT 20,0,
1010 GO TO 85

7FEB 3E37        LD    A,37
7FED 3E00        LD    A 00
7FEF DD21007D    LD    IX 7D00
7FF3 111400      LD    DE,0014
7FF6 CD5605      CALL  0556
7FF9 C9          RET
7FFA 00          NOP
```

Tape Decode
by M Smith

Space Bomber

on BBC Micro

The object of this game is to stop the bombs being dropped from the top of the screen and hitting the ground around your base To do this you move your base left and right along the bottom of the screen and fire missiles at the descending bombs The game ends when one of the bombs manages to get to ground level When this happens you are first thoroughly blown up and then your score is displayed

This program is slightly unusual in that it runs in *Mode 7* not in one of the graphics modes and does everything by *Poking* the Ascii codes of the characters to be displayed straight into the screen memory

In spite of the fact that there is only one bomb on the screen at any one time this game has been found to be very addictive by the people who have tried it

Program notes

Lines	
10	Sends the computer to the 'Title Page section of the program which then returns it to line 20
20 to 110	Set up the variables and the screen display
120	Is the beginning of the main loop.
130	Is obvious
140 to 150	Displays your score and the elapsed time
160	Passes control to the appropriate part of the program depending on the key pressed, ie left right or fire
170	Fires a missile from your base
180	Explodes the missile if it hits a bomb
190 to 210	Moves your base
220	Is a delay loop to prevent the bombs from slowing down when you fire a missile
230	Moves the bomb and tests to see if it has hit the ground

Turn to page 20

From page 19

230 Tests to see if bomb has been destroyed and if so loops a new bomb

250 is the last line of the main loop (*Until False* means forever)

260 to 360 Destroy your base and display your score when you let a bomb penetrate your defences

370 to 430 Display the Title Page

Variables

A — present position of base in the screen memory above HIMEM

AA — previous position of base in the screen memory above HIMEM

B — position of bomb in screen memory above HIMEM

I — position of missile in screen memory above HIMEM (only used for this purpose in lines 170 190 otherwise used as general loops)

S — number of bombs destroyed

```
5 REM ***COPYRIGHT C.HILL ***
10 GOTO 370
20 A=940:AA=940:S=0
30 CLS
40 FOR I=0 TO 880 STEP 40
50 ?(HIMEM+I)=130:NEXT I
60 ?(HIMEM+920)=132:?(HIMEM+960)=132
70 ?(HIMEM+40)=129
80 B=RND(149):IF B<129 THEN 80
90 ?(HIMEM+A)=65
100 FOR I=969 TO 989:?(HIMEM+I)=255:NEXT I
110 FOR I=89 TO 109:?(HIMEM+I)=255:NEXT I:TIME=0
120 REPEAT:M=INKEY(15-TIME DIV 1000):*FX 15 0
130 SOUND 1,-10,80,2:SOUND 1,-10,50,2
140 PRINTTAB(1,1);TIME DIV 100;" SECONDS "
150 PRINTTAB(30,1);S;" BOMBS";
160 IF M=32 THEN I=A-40:GOTO 170 ELSE IF M=90 OR M=47 THEN 190 ELSE 230
170 I=I-40:IF ?(HIMEM+I)=42 THEN 180 ELSE ?(HIMEM+I)=33:?
    (HIMEM+I+40)=32:IF I>16
0 THEN 170 ELSE ?(HIMEM+I)=32:GOTO 230
180 SOUND 0,-15,5,5:?(HIMEM+I+40)=32:?(HIMEM+I-1)=131:?
    (HIMEM+I)=255:FOR G=1 TO
500:NEXT G:?(HIMEM+I-1)=130:?(HIMEM+I)=32:S=S+1:GOTO 230
190 IF M=90 AND A>929 THEN A=A-1
200 IF M=47 AND A<949 THEN A=A+1
210 ?(HIMEM+AA)=32:?(HIMEM+A)=65:AA=A
220 FOR G=0 TO 100:NEXT G
230 IF ?(HIMEM+B)=42 AND B<879 THEN ?(HIMEM+B)=32:?
    (HIMEM+B+40)=42:B=B+40:GOTO 2
50 ELSE IF B>879 THEN 260 ELSE 240
240 B=RND(149):IF B<129 THEN 240 ELSE ?(HIMEM+B)=42
250 UNTIL FALSE
260T=TIME DIV 100
270MODE 5:VDU 19,128,14,0,0,0
280SOUND  0,-15,6,5
290FOR G=1 TO 1000 : NEXT G : MODE 7
300PRINTTAB(4,10)CHR$129"YOU MISSED IT , TOO BAD"'CHR$131"
   BUT YOU LASTED FOR ";T;" SECONDS"'CHR$131"AND DESTROYED ";S;" BOMBS"
310IF T+S>10 THEN PRINT CHR$129;SPC(8);"WELL DONE" ELSE PRINT
   CHR$133;SPC(6);"NOT SO GOOD"
320PRINT TAB(2,24)"PRESS ANY KEY TO START AGAIN"
330*FX 15 0
340FOR G=0 TO  500 : NEXT G
350SOUND  0,-12,RND(3)-1,10
360IF INKEY(10)=-1 THEN 350 ELSE RUN
370MODE 7
380FOR G=7 TO 8
390PRINT TAB(8,G)CHR$129;CHR$141;"SPACE BOMBER"
400NEXT G
410PRINT TAB(3,19)"PRESS Z TO MOVE LEFT"'"   PRESS / TO MOVE RIGHT"'"
   PRESS THE SPACE BAR TO FIRE"''"   PRESS ANY KEY TO START"
420*FX 15 0
430Z=GET:GOTO 20
```

Space Bomber
by C Hill

Voyager

on Vic 20

This program is for the Vic20 with Super Expander. It provides a simulation, in three of Voyager II flying past Saturn then passes by Voyager's cameras.

When the program is run some information about the Voyager is displayed before the simulation begins. Other information about Voyager's anatomy can be found within the program.

After Voyager has flown by there is a short delay before Saturn appears. A musical scale is played just before it appears.

```
1 REM   WRITTEN BY        KEVIN  BOYD.
2 REM
10 COLOR0,6,5,1 GOSUB5000
20 GRAPHIC3 GOSUB3000 POKE36881,160
21 FORS=1TO20 A=INT(RND(1)*1023) B=INT
   (RND(1)*1023) POINT2,A B NEXT
30 CIRCLE2 511,511 5000 7 500
40 CIRCLE2 511 510 400 40,92 60
45 CIRCLE2 511 530,450,60,92 60
50 CIRCLE2,511 550,500 100 80,63
55 REM CIRCLE2 511,570,550,120 80,63
60 REGION7
70 PAINT2,511 300
80 PAINT2,511,800
85 GOTO500
90 FORY=500TO1000STEP5
100 CIRCLE2 511 511,X*,7 X,50 100
110 CIRCLE2 511 511 X*.7,X,3,47
120 NEXT
530 PRINT"X-BAND DATA RATE, AT
    SATURN=44 000 BITS/SEC"
900 PRINT"5302CDEFGAB03C"
1000 FORS=180TO30STEP-0.05
1100 POKE36881 S NEXTS
1200 FORD=1TO1000 NEXTD
1300 FORS=0TO12STEP0 05
1400 POKE36880 S NEXTS
1500 FORD=1TO7000 NEXTD
2000 END
3000 POKE36881 160
3005 REM HIGH-GAIN DIRECTIONAL ANTENNA
3010 CIRCLE2,511,511,1000.7 100
     CIRCLE2,511,511 200.7 20
3020 DRAW2 470 470TO490 490 DRAW2 540
     470TO520 490 DRAW2 470 550TO490 530
3025 DRAW2 540 550TO520 530
3027 REM EXTENDABLE       BOOM
3030 DRAW2 505 515TO900 515TO900 505TO595 505 PAINT2,700,511
3035 REM PLANETARY      RADIO ASTRONOMY AND PLASMA WAVE ANTENNA
3040 DRAW2 540 500TO755 900 DRAW2 480 500TO305,900
3045 REM RADIOISOTOPE        THERMOELECTRIC           GENERATOR
3050 DRAW2 515 410TO515 800TO495 800TO495 1000TO540,1000TO535 800TO515,800
3055 REM DETECTOR ARM
3060 DRAW2 515 410TO515 100
3070 CIRCLE2 490 100 200 7 20 DRAW2TO530 100 CIRCLE2 540,100,200,7 20
3100 FORS=160TO365STEP-0.05
3110 POKE36881 S NEXTS
3190 FORD=1TO2000 NEXTD
3200 FORS=12TO0STEP-0,05
3210 POKE36880 S NEXTS
3300 FORS=30TO0STEP-0.05
3310 POKE36881 S NEXTS
3330 SCNCLR RETURN
5000 PRINT"VOYAGER II"
5005 PRINT"
5010 PRINT"WEIGHT = 930KG"
5020 PRINT"DATA STORAGE = 558    MILLION BITS"
5030 PRINT"X- BAND DATA RATE AT    SATURN=44 800 BITS/SEC"
5040 PRINT"DIAMETER , HIGH GAIN  ANTENNA  3.7M"
5050 PRINT"THERMOELECTRIC GENERAT-OR AT SATURN APPROXIMATELY 400W"
5060 PRINT"PRESS ANY KEY TO START"
5070 POKE198 0 WAIT198 1
5080 RETURN
```

Voyager
by Kevin Boyd

Eclipse

on ZX81

This program for the 16K ZX81, will draw an ellipse of a specified height and width from any given starting position to any given finishing position.

Variables used

- a. width of ellipse
- b. height of ellipse
- c start position
- d finish position
- o angular displacement in radians
- x plot co-ordinates
- y plot co-ordinates
- f sets up axis

```
HEIGHT 20
WIDTH 50

COPY  C   STOP  S  AGAIN  A
```

```
HEIGHT 18
WIDTH 16

COPY  C   STOP  S  AGAIN  A
  5 REM ELLIPSE
 10 PRINT AT 20,0,"
 20 PRINT AT 20,0," INPUT WIDTH
 30 INPUT A
 40 PRINT AT 20,0,"HEIGHT
 50 INPUT B
 60 PRINT AT 20,0,"START "
 70 INPUT C
 80 PRINT AT 20,0;"FINISH
 90 INPUT D
100 PRINT AT 20 0,"
110 REM DRAW AXIS
120 FOR F=0 TO 20
130 PRINT AT 10,F "-"
140 PRINT AT F,10,
150 NEXT F
160 REM DRAW ELLIPSE
170 LET C=C/180*PI
180 LET D=D/180*PI
190 FOR O=C TO D STEP .08
200 LET X=A*COS O+20
210 LET Y=B*SIN O+23
220 PLOT X,Y
230 NEXT O
240 PRINT AT 2,20, HEIGHT ",B,AT 4,20, WIDTH ",A
250 PRINT AT 20,0," COPY  C   STOP  S  AGAIN  A"
260 IF INKEY$="C" THEN COPY
270 IF INKEY$="S" THEN STOP
280 IF INKEY$="A" THEN RUN
290 GOTO 260
```

Ellipse
by William Meadowcroft

Pencil

on ZX81

Ask your computer to multiply a 14 figure number by another 14 figure number and it will not be dismayed by the problem a couple of seconds and the answer appears. So what is the problem? The answer is only partially correct it has been rounded to 8 figures and to add to the confusion it is expressed in Exponent Notation. How often do you need to multiply such large numbers and arrive at an exact answer? Not often.

However, a 6 figure number multiplied by a 3 figure number will produce a 9 figure answer, and even this will be rounded to 8 figures. The self inflicted task was to write a program that would deal with any sum from 2 × 2 up to as large as the screen will hold, and to set the numbers out correctly on the screen.

The task proved to be far more difficult than expected because no functions like *Val* could be used if they were to be applied to numbers greater than 8 figures, they too have the rounding off syndrome. This is where the pencil and paper come in. To achieve the desired result, the computer has to be made to proceed just as a mere mortal would with pen and pad.

To be able to print the numbers where

Turn to page 23

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required on the screen It is useful to know the length of the numbers so strings were the obvious choice to hold them As soon as a string had been established it was followed by a simple variable set to the length of the string and bearing the same name as the string

```
10 INPUT A$
30 LET A = LEN A$
```

or

```
30 DIM D$ (8 A - 8)
40 LET D = LEN D$ (8)
```

Notice that the *Len B$* and *Len A$* have been used in dimensioning D$ they are also used as mentioned in setting *Print* positions

```
30 PRINT AT 3 + 8 18 - A A$
```

The lengths of the various lines are also related to the lengths of the numbers

Having checked the inputs, printed them on the screen and drawn a line under them before multiplication can begin a string array must be dimensioned to hold the answers for addition later The first subscript (the number of strings) is easy it is the same as the length of the multiplier The second (the length of the string) requires a litte foreindught If a typical sum is written down thus

```
   3 5 2 4 × 5 3 4 1
   5 3 4 1
   -------
   3 5 2 4
 1 4 0 9 6 *
1 0 5 7 2 * *
1 7 6 2 0 * * *
```

All of the spaces occupied by "*" should be filled with zeros to give each answer the correct value (when using pencil and paper some people put them in as an aid to the alignment of the columns) The job of multiplying each answer by the appropriate power of 10 is simple, but we cannot allow the computer to do it for us because of — you guessed — rounding off

The zeros must be added to the numbers by putting them into the strings hence the strings are dimensioned to take the longest number plus the required number of zeros This just happens to be the combined lengths of the multiplier and multiplicand

The computer must now work as with pencil and paper and multiply the last figure of the upper number by the last figure of the lower number The units of the result must be printed on the screen and put into the correct string The carry, if any, must be noted The answers to each multiplication can be the same length as the multiplicand or one digit longer The loop performing this task must be the same length as the multiplicand, so that when leaving the loop, and before re-entry it deals with the next figure in the lower number The carry (if it is not zero) is printed also The carry, whatever his value, is put into the string

This manoeuvre keeps the occupied length of each string the same, and makes life easy later on When the zeros are added to the strings, the addition can start at the same point in each string The shorter numbers will carry a leading zero which pads them out to the same length as the longer numbers without affecting their value

The multiplication procedure is repeated until complete when a line is drawn under the sum A loop is now entered to add the appropriate number of zeros to each string, after which the first string will contain a number and lots of zeros The last string will have a number and lots of spaces Those in between will have a combination of all three Another loop this program has them all performs what may seem a very odd function It takes each string in turn and looks at the last character If this is a space, it adds a zero to the front of the string and pushes the space off the other end This is repeated until all of the spaces are gone It then turns its attention to the next string, until all strings have been dealt with

All the numbers are moved up their respective strings until their units are at the end of the string and nicely aligned for the addition which is about to follow Yet another loop in fact a loop within a loop attends to the addition, starting from the units end of the strings and printing the answers as it proceeds The 28 figure answer complete a final loop draws a double line to finish things off and the ZX81 asks for another sum

The program is not fast a reader may even write in to say he or she can do it faster with pencil and paper My money would be on the computer producing the right answer The program can be run *Fast*, but this will deprive you of the pleasure of seeing your ZX81 earning its keep, digit by digit

by W Googe

Layouts

on Dragon

If you own a Dragon and can get access to a printer you will find this program useful

The program is in two parts The first part (lines 20-150) prints a screen layout chart as shown in Figure 1 The alphabetic line at the bottom is provided to assist in centering headings etc. This part of the program could be run twice on the A4 sheet to produce a master for photocopying

The second part of the program prints a table as in Figure 2 of the numbers to be used in *Print @* statement in order to cause printing at any desired position This requires a printer capable of printing 132 characters on a line This is set on the Oki Microline printer by sending *Chr$(29)* to the printer (line 150)

```
10 'DRAGON LAYOUTS Copyright T P Goldinsham 1983
20 'screen
30 PRINT#-2,CHR$(31):PRINT#-2:PRINT#-2,TAB(16)"DRAGON"
40 PRINT#-2:PRINT#-2:PRINT#-2,TAB(13)"SCREEN LAYOUT"
50 PRINT#-2,CHR$(30):PRINT#-2:PRINT#-2
60 A$=" 0 1 2 3 4 5 6 7 8 9"
70 PRINT #-2,TAB(7)A$;A$;A$;" 0 1"
80 FOR J=0 TO 15
90 PRINT#-2,USING"##";J;:PRINT#-2,TAB(7)CHR$(124);
100 FOR K=0TO 31
110 PRINT#-2, CHR$(95);CHR$(124);
120 NEXT K
130 PRINT#-2
140 NEXT J
```

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```
150 PRINT:PRINT#-2,TAB(7)" P O N M L K J I H G F E D C B A
    A B C D E F G H I J K L M N O P"
160 'print @
170 PRINT#-2:PRINT#-2:PRINT#-2:PRINT#-2:PRINT#-2,CHR$(31);
    TAB(16)"PRINT @"
180 PRINT#-2,CHR$(29):PRINT#-2:PRINT#-2
190 A$="   0   1   2   3   4   5   6   7   8   9"
200 PRINT#-2," "A$;A$;A$;"   0   1":PRINT#-2
210 FOR J=0 TO 15
220 PRINT#-2,USING"##";J;
230 FOR K=1 TO 32
240 PRINT #-2,USING " ###";X;
250 X=X+1
260 NEXT K
270 PRINT #-2
280 NEXT J
290 CLS:PRINT"PRINTING COMPLETED"
```

Figure 1

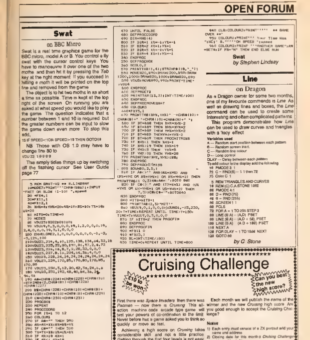
```
                         DRAGON
                     SCREEN LAYOUT
       0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
  0   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  1   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  2   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  3   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  4   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  5   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  6   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  7   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  8   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
  9   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
 10   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
 11   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
 12   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
 13   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
 14   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
 15   |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
       P O N M L K J I H G F E D C B A A B C D E F G H I J K L M N O P
```

Figure 2

PRINT @

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
2	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
3	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
4	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
5	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
6	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
7	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
8	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
9	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
10	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351
11	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383
12	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415
13	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447
14	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479
15	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511

Layouts
by Tim Goldingham



Swat

on BBC Micro

Swat is a real time graphics game for the BBC micro, model A or B. You control a fly swat with the cursor control keys. You have to manoeuvre it over one of the two moths and then hit it by pressing the *Tab* key at the right moment. If you succeed in hitting a moth it will be printed on the top line and removed from the game.

The object is to hit two moths in as short a time as possible. Time is kept at the top right of the screen. On running you are asked at what speed you would like to play the game. The question indicates that a number between 1 and 10 is required but the greater numbers can be input to slow the game down even more. To stop this add,

```
15 IF SPEED<1OR SPEED>10 THEN GOTO10
```

NB. Those with OS 1.0 may have to change line 80 to

```
VDU23 1 0 0 0 0
```

This simply tidies things up by switching off the flashing cursor. See User Guide page 77.

```
5 REM SWAT-V2 ** S.LINDSAY
10MODE7:PRINT'''CHR$(134);:INPUT
"FAST OR SLOW (1-10) ",speed
20 *FX4,1
30*FX11,1
40*FX12,1
50 XH%=4:YH%=20:A%=10:B%=10:T%=18:
U%=20
60 HITS=0:TIME=0
70 MODE5
80 VDU23;8202;0;0;0;
90 VDU19,0,3,0,0,0,19,1,2,0,0,0,19,
2,4,0,0,0,19,3,1,0,0,0
100 ENVELOPE2,1,0,0,0,0,0,0,-1,-2,
-3,126,100
110VDU23,224,4,10,125,138,134,64,32,18
120VDU23,225,32,80,190,81,97,2,4,72
130VDU23,226,18,8,7,2,28,32,0,0,0
140VDU23,227,8,16,224,64,36,4,0,0
150 VDU23,228,24,24,24,24,24,24,24,24
160 VDU23,229,170,85,170,80,170,85,
170,80
170 VDU23,230,3,12,20,42,36,24,6,6
180 VDU23,231,192,48,40,84,36,24,
96,96
190 A$=CHR$(224)+CHR$(225)+CHR$(10)
+STRING$(2,CHR$(8))+CHR$(226)
+CHR$(227)
200 B$=CHR$(228)+CHR$(10)+CHR$(8)+
CHR$(228)+CHR$(10)+CHR$(8)+CHR$(229)
210 C$=CHR$(230)+CHR$(231)
220 PROCBOX
230 REPEAT
240 PROCCOORD
250 FOR I%=1 TO 12
260 COLOUR1
270 IF A$="" THEN 290
280 A%=A%+X%:B%=B%+Y%
290 IF C$="" THEN 310
300 T%=T%+X%:U%=U%+X%
310 IF A%>19 A%=1
320 IF A%<1 A%=19
330 IF B%>28 B%=5
340 IF B%<5 B%=28
350 IF T%>19 T%=1
360 IF T%<1 T%=19
370 IF U%>29 U%=5
380 IF U%<5 U%=29
390 IF A$<>"" PRINTTAB(A%,B%);A$
400 IF C$<>"" PRINTTAB(T%,U%);C$
410 T=TIME:REPEAT UNTIL TIME>T+speed:
BT=INKEY(0)
420 IF A$<>"" PRINTTAB(A%,B%);"  "+
CHR$(10)+STRING$(2,CHR$(8))+"  "
430 IF C$<>"" PRINTTAB(T%,U%);"  "
440 PROCMOVESWAT
450 PROCTI
460 NEXT
470 UNTIL FALSE
480 DEFPROCCOORD
490 DIR=RND(4)
800 IF DIR=1 X%=-1:Y%=-1
510 IF DIR=2 X%=1:Y%=1
520 IF DIR=3 X%=-1:Y%=1
530 IF DIR=4 X%=1:Y%=-1
340 ENDPROC
550 DEFPROCBOX
560 GCOL0,2
570 PRINTTAB(1,4);STRING$(18,"_");
580 MOVE820,890:DRAW1200,890:DRAW
1200,1000:DRAW820,1000:DRAW820,890
590 VDU5:MOVE890,990:PRINT"TIME"
:VDU4
600 ENDPROC
610 DEFPROCTI
620 PRINTTAB(13,3);INT(TIME/100)
630 ENDPROC
640 DEFPROCMOVESWAT
650 COLOUR3
660*FX15,1
670 PRINTTAB(XH%,YH%)" "+CHR$(10)+
CHR$(8)+" "+CHR$(10)+CHR$(8)+" ";
680 IF BT=136 THEN XH%=XH%-2
690 IF BT=137 THEN XH%=XH%+2
700 IF BT=138 THEN YH%=YH%+2
710 IF BT=139 THENYH%=YH%-2
720 IF BT=9 THEN PROCHITMISS
730 IF XH%<1 THEN XH%=1
740 IF XH%>19 THEN XH%=19
730 IF YH%<5 THEN YH%=5
760 IF YH%>28 THEN YH%=28
770 PRINTTAB(XH%,YH%);B$;
780 ENDPROC
790 DEFPROCHITMISS
800 SOUND0,2,5,1
810 IF A$<>"" AND(A%=XH%) AND
(B%=YH% OR B%=YH%+1 OR B%=YH%+2) THEN
PRINTTAB(10,3)A$:A$="":GOTO 840
820 IF C$<>"" AND (T%=XH%) AND (U%
=YH% OR U%=YH%+1 OR U%=YH%+2) THEN
7,3);C$:C$="":GOTO840
830 ENDPROC
840 HITS=HITS+1
850 PRINTTAB(2,3)"HIT!"
860 VDU19,0,1,0,0,0;SOUND1,-15,230,
20:T=TIME:REPEAT UNTIL TIME>T+150:
TIME=T:VDU19,0,3,0,0,0
870 IF HITS=2 THEN PROCFIN
880 ENDPROC
890 DEFPROCFIN
900 *FX11 0
910 *FX15,1
920 SL=INT(TIME/100)
930 TIME=0:REPEAT UNTIL TIME=800
940 CLS:COLOUR3:PRINT''''  ** GAME
OVER **"
950 COLOUR1:PRINT''' Your Time Was
";SC;" S.'''''ON SPEED ";speed
960 COLOUR2:PRINT '''"ANOTHER GAME";A$
=GET$:IF A$="N" THEN END ELSE RUN
```

Swat
by Stephen Lindsay

Line

on Dragon

As a Dragon owner for some two months, one of my favourite commands is *Line*. As well as drawing lines and boxes, the *Line* command can be used to create some interesting and often complicated patterns.

This program demonstrates how *Line* can be used to draw curves and triangles with a 'lacy' effect.

Variables used
A — Random start position between each pattern
B — Random screen start
C — Random line colour
D — Loop control
DLAY — Delay between each pattern
To add colour to the display add the following

```
10 PMODE 3 1
72 C = RND(8) – 1 1 then 72
75 Color C 1
```

```
5 REM TRIANGLES AND CURVES
10 REM (C) C.A.STONE 1982
20 PMODE 4 1
30 D = RND (76)
40 B = RND (255)
50 SCREEN 1 1
60 PCLS
70 FOR A = 1 TO 255 STEP 3
80 LINE (B A) – (A,D) PSET
90 LINE (B A) – (A,D + 58) PSET
100 LINE (B A)   (A D + 100) PSET
110 NEXT A
120 FOR DLAY = 1 TO 1000 NEXT
130 GOTO 30
```

by C Stone

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1) Each entry must consist of a ZX printout and your name and address
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3) The highest score each month will receive £10
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5) The judges decision is final
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Walking the wires

***Peter Donn** explains how to use an analogue to digital converter as a voltmeter.*

The following program for the BBC model B enables you to test the voltages of any battery up to 1 8 volts The only additional hardware needed are two small thin wires and the batteries to be tested

When Run the program will display an analogue and digital readout of the voltage of the battery With no battery connected the readouts will be apparently random Do not worry, your machine is perfectly alright — it is just the internal parts of the digital to analogue converter working hard!

It would be preferable to use proper plugs to connect your wires to the converter, but most model B owners just do not have any lying around You can do what I do — push the wires into the appropriate holes carefully Don't worry, I won't tell Acorn You need two wires coming from the following holes on your converter

Ⓐ ○ ○ ○ ○ ○ ○ ○
Ⓑ ○ ○ ○ ○ ○ ○

When you connect the other ends of the wires to the poles of the battery, wire *A* goes to the negative terminal and wire *B* to the positive Do *not* use voltages such as that on a PP3 battery for example that are higher than 1 8 volts

The program does not have any particularly strange features except for the **FX* on line 30 which makes sure analogue conversion is only on one channel the use of selected print format line 40 (see manual under 'PRINT'), the character definition on line 50 and of course the taking of analogue readings on line 250 ■



```
 10 REM COMPUTERMETER — © PETER DONN, NOVEMBER 1982
 20 MODE1
 30 *FX16,1
 40 @%=&0002020A
 50 VDU23,8202,0,0,0,19,3,2,0,19,2,4,0,19,1,3;0;23,224,0,0,32,96,255,255,96,32
 60 COLOUR2
 70 PRINTTAB(20,8),"POTENTIAL",TAB(20,10),"DIFFERENCE",TAB(20,12),"IS",TAB(20,18),"VOLTS
 80 VDU5
 90 GCOL0,3
100 MOVE200,900 PRINT"VOLTS"
110 MOVE370,765 DRAW370,250
120 B=0
130 FORA=250 TO 800 STEP56 83
140 MOVE0,A+20 PRINTB
150 B=B+0 2
160 MOVE336,A+32 PRINT"—
170 NEXT
180 GCOL0,1 MOVE100,100 DRAW100,950 DRAW1100,950 DRAW1100,100,DRAW100,100
190 GCOL3,1
200 A%=65520 B=1 8
210 Z%=-1
220 REPEAT
230 TIME=0 REPEAT UNTILTIME>30
240 MOVE385,Z% PRINTCHR$224
250 P=ADVAL(1)/A%*B
260 C=270+(P*286 11)
270 MOVE385,C
280 Z%=C
290 PRINTCHR$224
300 VDU4 COLOUR1 PRINTTAB(20,15),P VDU5 GCOL3,1
310 UNTILFALSE
```





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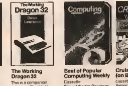
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I turned the cat in the pan once more and so . . .

***Nick Godwin** presents a copycat program for the 16K and 1K Sinclair ZX81*

One of the problems of using *Plot* and *Unplot* to produce images is that they are not easily copied into strings for storage and subsequent recall The obvious way of doing this is to scan the display file which is a slow business in Basic Also, there is the constant danger of accidentally pressing *Break* and losing the image altogether

In an attempt to solve this problem I wrote a program which records the successive *Plot* and *Unplot* co-ordinates as the image is being drawn so that it could later be reconstructed It was when I accidentally ran such a program to reconstruct an image in *Slow* mode that I noticed an interesting effect This program is designed to take advantage of that effect

The program as it is presented here although a complete entity in itself, by no means constitutes a full exploration into the potential offered by the technique I have tried to design the program in a way that will allow the reader first to easily comprehend the principles on which it works, and then to adapt and develop this for his or her own purposes

The program is simple enough to operate It is constructed in two parts — the first part accessed by Run, consists of a drawing board with 8-directional control using unshifted keys *1* to *8* Pressing any other key will cause the program to change mode from *Plot* to *Unplot* or vice versa When a drawing is completed, press *Break*

The second part of the program starts at line 300 and is accessed by the command *Goto* 300 It is fascinating to see the image being reconstructed exactly as you originally entered it after which it reverts to the former mode and the user can continue drawing Creative programming can further enhance the effects by incorporating other controls such as *Scroll* and *Cls* into the drawing board and having these encoded into the string for playback later

To do the program justice a 16K Ram pack is needed However I have also included a much simplified version adapted for the 1K machine which will at least offer a taste of the possibilities to those who are wholly reliant upon on-board Ram And a further accident revealed a very interesting additional effect which can only work on the 1K version (and for which the drawing needs to be restricted to the left-hand side of the screen)

```
1 GOTO VAL  100
2 PLOT X Y
3 RETURN
```

```
100 LET A$=  UNPLOT
110 POKE VAL  16525  CODE A$
120 LET X=CODE  3
130 LET Y=CODE  =
140 SLOW
150 PLOT X Y
160 UNPLOT X Y
170 IF INKEY$=   THEN GOTO VAL  150
180 GOSUB VAL  2
190 LET Z  VAL  CODE INKEY$  28
200 IF Z>VAL  8 THEN GOTO VAL  150
210 LET X  VAL  X+(X<63)*(Z=2 OR Z=3 OR
    Z 8)  (X>0)*(Z  1 OR Z  4 OR Z  5)
220  LET Y  VAL  Y+(Y<43)*(Z  1 OR Z  2 OR
    Z  7)  (Y>0)*(Z=3 OR Z  4 OR Z=6)
230 LET A$  A$+CHR$ X+CHR$ Y
240 GOTO VAL  150
250 LET Z  VAL  16525
260 POKE Z,VAL  PEEK Z+8*((PEEK
    Z=248)  (PEEK Z=252))
270 GOSUB VAL  2
280 LET A$=A$+CHR$ PEEK Z
290 GOTO VAL  150

300 SLOW
320 FOR J=VAL  1  TO LEN A$
330 IF CODE A$(J)>VAL  63  THEN GOTO VAL
     400
340 LET X=CODE A$(J)
350 LET Y=CODE A$(VAL  J+1 )
360 LET J  VAL  J+1
370 GOSUB VAL  2
380 NEXT J
390 GOTO VAL  150
400 POKE VAL  16525  CODE A$(J)
410 GOTO VAL  320
```

The first part of the 1K program 100 to 170 should be entered and run Then (usually following report code 4) those lines should be deleted and the new lines 100-120 should be entered and operated (by *Goto*, not by Run)

```
100 PLOT X Y
110 IF INKEY$     THEN GOTO VAL  110
120 LET X  X+(INKEY$  2 OR INKEY$= 3 OR
    INKEY$= 8 )-(INKEY$= 1  OR INKEY$= 4
    OR INKEY$   5 )
130 LET Y  Y+(INKEY$= 1  OR INKEY$= 2  OR
    INKEY$= 7 )  (INKEY$   3  OR INKEY$   4
    OR INKEY$= 6 )
140 LET A$(J)=CHR$ X
150 LET A$(VAL  J+1 )=CHR$ Y
160 LET J  VAL  J+2
170 GOTO VAL  100
```

To operate this program first assign values to *J X* and *Y* eg

```
LET J=3 (J must start off at 3)
LET X  10 (X and Y values optional to Plot)
LET Y  10
```

Also an array must be *dimmed* I have found the optimum length to be about 150 bytes Keeping as far as possible to the left of the screen helps make the memory go further so you can have a longer string eg

```
DIM A$(150)
```

Now do the following commands

```
LET A$(1)=CHR$ X
LET A$(2)=CHR$ Y
SLOW
GOTO 140
```

Start drawing and remember, keeping as far as possible (but not too far!) to the left makes the Ram go further When your drawing is finished, press *Break* (if you have not already got report code 4) and enter the following lines

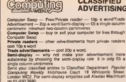
```
100 FOR J=VAL  1  TO LEN A$ STEP VAL  2
110 PLOT CODE A$(J) CODE A$(VAL  J+1 )
120 NEXT J
```

Depending upon the program, you may need to delete the rest of the lines If not add *130 Stop* Put the computer into *Slow* mode and *Goto* 1

For the 1K program only try changing line 100 to

```
100 FOR J=VAL  1  TO LEN A$
```





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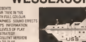
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Developing addresses

***Tim Crispin** provides a simple method of Peeking and Poking to the screen display*

I read *Popular Computing Weekly* regularly and was very interested in the article explaining how to *Peek* and *Poke* the ZX Spectrum screen (January 6, page 24). However, I feel that the routine developed to give the address was too complex and should not have required the machine code routines mentioned. In fact, a very simple line of Basic will give the address of any character position on the screen from the line and column numbers, see Program one.

The program is simplified by considering the screen address to be composed from two bytes — a high and low one to be exact. The high byte has the form *010 aa bbb (Bit 6 is set ie 2↑6=64)*. The bits 'aa' represent the block of eight lines needed on the screen and can be determined from the line number. If *Line* is the variable used, the byte is given by *High = 64* [←From Bit 6] + *8∗ Int(Line/8)* [←aa] + *Cpl* [bbb]. I have called the bits 'bbb' *Cpl* as these are the Character Pixel Line number.

The low byte has the form *ccc ddddd (ie two binary parts)*. The bits 'ccc' form the line required within a block of lines. This is simply the fraction left when 'aa' was found, eg *Line=9* has *aa=Int(9/8)=Int(1⅛)*, so *ccc = 8* times the fraction. The bits *ddddd* form the column number which is given the name *Col*. Thus the byte is found from *Low = 32∗8∗(Line/8 − Int (Line/8))* [←ccc] + *Col* [←ddddd].

The screen address can now be found from *Addr = High∗256 + Low*. So, *Addr = (64+8∗Int(Line/8)+Cpl)∗256 +(Line/8−Int(Line/8))∗256+Col*. This simplifies to *Addr = (64 + 7∗Int(Line/8) + Line/8 + Cpl)∗256 + Col* which is line 40 in program one.

To see what *Cpl* means, the following line should be added to program one: *30 Input 'Cpl ',Cpl*. Running the program and entering the values shown below is the best way of explaining *Cpl*.

LINE	1	1	1	1	1	1
COL	0	1	2	3	4	5
CPL	0	1	2	3	4	5

However, there is no need to calculate *Cpl* manually. It is possible to use a *Y* co-ordinate to represent the position and determine *Line* and *Cpl*. Alter program one as shown:

```
10 INPUT 'y' Y LET LINE = INT ((175-Y)/8)
30 LET CPL = 8*((175-Y)/8-LINE)
```

This works because *Y/8 = Line + ⅛∗Cpl*. The *(175−Y)* is needed as *Print At 0,0* is at the top left whereas *Y* is taken from the bottom left.

The equation can be simplified so that the variable *Cpl* is not used, see program two. Line two is a subroutine that gives the screen address of any position defined by a *Y* co-ordinate and column number *Col*. The program executes a very simple scroll of a graphics "A" upwards at a pixel resolution. However, the subroutine at line two could easily be used for more complex screen effects.

Lastly, I have shown how the screen address can be found using machine code, see program three. The routine is very simple and can be loaded to any address using any hex loader. The subroutine converts the line/column values held in the *BC* register pair into a screen address held in the *Hl* register pair. This always has *Cpl=0*, though register *H* now controls the value of *Cpl*. By this I mean that the value of *Cpl* merely has to be added to register *H* to obtain the screen address. This explains the strange memory arrangement used for the Spectrum's screen, for it is very easy to print characters using this arrangement, as can be seen in program four. ■

The ZX Spectrum being used at Sutton Primary School Cambridgeshire

Program 1

```
1 LET CPL = [illegible]
10 INPUT LINE [illegible]
20 INPUT COL [illegible]
40 LET ADDR = [illegible]
   8+CPL)*256+COL
50 POKE ADDR,255 GOTO [illegible]
```

Program 2

```
1 LET COL = 0 GOTO 10
2 LET LINE = INT ((175-Y)/8) [illegible]
  (239+7*INT LINE - 63*LINE [illegible] Y) [illegible]
  RETURN
10 FOR N = 0 TO 164
20 FOR J = 0 TO 7 LET Y=N-J
30 GOSUB 2 POKE ADDR PEEK( USR "A"+J)
   NEXT J
40 LET Y=N-8 GOSUB 2 POKE ADDR,0 REM
   Blank last position
50 NEXT N
```

Program 3

```
78                [illegible]
E6 18             [illegible]            ;isolate bits 3&4 from the line number
C6 40             [illegible]            ;makes bit 6 equal 1
67                [illegible] H A        ;this is the HIGH byte
78                LD A B
E6 07             AND 07                 ;obtains 'ccc' from line number
0F 0F 0F          RRCA RRCA RRCA         ;moves 'ccc' into correct part of byte
81                ADD A C                ;add the column number
6F                LD L A                 ;this is the LOW byte
C9                RET
```

Program 4

```
0E 1E    START   LD C 1E          ;column 30
2A 5C7B  LOOP1   LD HL (UDG)      ;address of the character set
EB               EX DE HL
06 15            LD B 15          ;line 21
CD ????  LOOP2   CALL ADDR        ;find the screen address
C5               PUSH BC          ;save line column values
06 08            LD B 08          ;characters are 8 bytes long
1A       LOOP3   LD A (HL)        ;byte defining shape of character
77               LD (HL) A        ;put byte on screen
24 13            INC H INC DE     ;move pointers to next byte
10 FA            DJNZ LOOP3
C1               POP BC
10 FB            DJNZ LOOP2       ;change the line number
0D               DEC C            ;change the column number
20 E6            JRNZ LOOP1
C9               RET
```

Dictionary

MODULE 5 *Lines 6000-6360*

This is our standard data file handling module expanded to take account of the fact that we now wish to load or save four different sets of data — individual characters from tape, character sets to tape the dictionary from tape and the dictionary to tape

Commentary

6070-6140 This section saves the current character set to tape together with the variable CI which indicates how many characters it contains

6150-6200 This section loads a single character from tape and stores it in the dictionary

6210-6270 This section stores the current dictionary on to tape

6280-6340 This section loads a dictionary from tape Note that a new dictionary can be loaded during the creation of a character set thus allowing the character set to draw upon a wider range of characters than can be contained within one dictionary

Testing

You should now be able to pick up characters created by the previous program compile them into a dictionary or dictionaries and using these dictionaries compile your own character sets and save them on tape If these functions are all available the program is correctly entered and ready for use

DICTIONARY *Summary of single key functions*

With flashing cursor

Left and right arrows move cursor

Up and down arrows move display to new page of dictionary

"D — deletes character above cursor from dictionary

"C" — adds character above cursor to current character set

"Q" — returns control to menu

No flashing cursor (character set display)

"D" — deletes current character set

Any other key returns to menu

SUMMARY

This is an uncomplicated program for the simple reason that it is designed to leave the maximum amount of space for the strings containing the actual characters themselves Once entered you are ready to embark on the task of creating and compiling sets of characters for use in high resolution mode As previously mentioned later programs will take you further by showing practical ways to use such character sets without having to specify the *Drawing* of each character separately

GOING FURTHER

(1) As with the character creator itself this program will only come into its own when you get around to compiling a dictionary or two

(2) Text is not the only area where the programmer might benefit from having a set of 'characters' available in high resolution modes What about developing sets of symbols for electronic diagrams for instance Remember that using the *Draw* command such symbols can be rotated, so that a single symbol is all that will be necessary for each component no matter what its orientation may be You could perhaps add the ability to *Draw* such characters to a program such as 'Designer' thus allowing symbols and text to be made an integral part of the designs created using that program ■

```
6000 REM************************
6010 REM DATA FILES
6020 REM************************
6030 MOTOR ON AUDIO ON CLS INPUT "POSITION TAPE THEN RRESS enter  <MOTOR IS ON>'
";Q$
6040 MOTOR OFF:INPUT "PLACE RECORDER INTO CORRECT MODETHEN PRESS enter",Q$
6050 PRINT PRINT "FUNCTIONS AVAILABLE:","1>SAVE CHARACTER SET",'2>LOAD NEW CHARA
CTER","3>SAVE DICTIONARY","4>LOAD DICTIONARY" INPUT "WHICH DO YOU REQUIRE ";Q ON
 Q GOTO 6070,6150 6210,6280
6060 RETURN
6070 MOTOR ON:FOR I=1 TO 10000:NEXT
6080 OPEN "O",£-1,"CHARSET"
6090 PRINT £-1,CI
6100 FOR I=0 TO CI-1
6110 PRINT £-1,CHAR$(I)
6120 NEXT I
6130 CLOSE £-1
6140 RETURN
6150 IF DI=100 THEN RETURN
6160 OPEN "I",£-1,"CHAR"
6170 INPUT £-1,D$
6180 CLOSE£-1
6190 LET DI$(DI)=D$ LET DI=DI+1
6200 RETURN
6210 MOTOR ON FOR I=1 TO 10000:NEXT I:OPEN "O" £-1,"DICT"
6220 PRINT £-1 DI
6230 FOR I=0 TO DI-1
6240 PRINT £-1,DI$(I)
6250 NEXT I
6260 CLOSE £-1
6270 RETURN
6280 OPEN "I" £-1,"DICT"
6290 INPUT £-1,DI
6300 FOR I=0 TO DI-1
6310 INPUT £-1,DI$(I)
6320 NEXT I
6330 CLOSE £-1
6340 GOTO 1000
6350 LET D$="BM+1,+0,R0;" FOR N=0 TO 2 LET E$="":FOR I=0 TO 13 LET E$=E$+D$ LET
DI$(H*14+I)=E$ NEXT I:NEXT H LET DI=40
6360 RETURN
```

Breathing fire

Keith and Steven Brain
explain how you can write your own Dragon games

Although some superb games software is now available for the Dragon 32, half the fun of having your own computer is being able to design and write your own original games programs. However, even when you have read through the manual and understood the Basic commands themselves you must still learn how to link these together to build up useful and sophisticated programs.

Let's start with something simple — and what could be simpler than a reaction tester to see how fast you can respond to seeing a character appear on the screen. Remember that many action games are based on quick and accurate responses.

```
10 CLS (clear screen)
20 A=RND(500) (choose random no 1-500)
30 A=A-1 (decrease this by 1)
40 IF A>0 THEN 30 (if A not 0 then go back)
70 TIMER=0 (start timer)
80 PRINT "*" (print a star)
100 A$=INKEY$ (check if any key pressed)
110 IF A$="" THEN 100 (if no key pressed recheck)
150 PRINT TIMER (print reaction time)
160 GOTO 20 (start again)
```

Well that's OK as far as it goes, but it soon becomes easy as the star always appears in a predictable position on the screen. Why not add to the difficulty by moving the position of the star around the screen at random? There are 512 print positions (0-511), so simply change the program by adding

```
60 B=RND(512)-1 (choose random no 0-511)
80 PRINT @ B, "*" (print star at that position)
```

That prints the star at random, but the reaction time display also jumps around unless we add

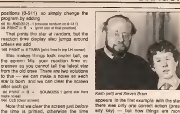
```
150 PRINT @ 0,TIMER (print time in top LH corner)
```

This makes things look neater but, as the screen fills, your reaction time increases as you cannot tell the latest star from the old ones. There are two solutions to this — we can make a noise as each star is born, and we can clear the screen after each go

```
80 PRINT @ B, "*" : SOUND256,1 (print star then make noise)
144 CLS (clear screen)
```

Note that we clear the screen just *before* the time is printed, otherwise the time display will never be seen.

Even that modification does not take too much getting used to, so let's bring in a bit more skill by printing a *1* or a *2* and saying that you must only press a key if a *2* appears. In the first example with the star there was only one correct action (press any key) — but now things are more complicated. To be right you *must* press a key if a *2* appears, but you *must not* press a key if a *1* appears.



Keith (left) and Steven Brain

DISPLAY	KEY PRESSED?	
2	yes	RIGHT
2	no	WRONG
1	yes	WRONG
1	no	RIGHT

But, if no key at all is pressed, the program will loop back from 110 to 100 for all eternity! We can resolve this problem by putting a *For-Next* loop of fixed length around the *Inkey$* check. This sends you back to the start without a time print if you run out of time or if you press a key when a *1* is displayed.

```
70 C=RND(2) (choose 1 or 2 at random)
80 PRINT @ B,C : SOUND 255,1 (print number chosen)
90 FOR N=1TO500 (check if any key pressed 500 times)
110 IF A$="" THEN NEXT : GOTO 10 (if no key pressed recheck — if checked 500 times then go back to start)
120 IF C=1 then 10 (if a key was pressed and a 1 was displayed go straight back to start)
```

To make sure you notice your errors add some raspberries and success notes

```
110 IFA$="" THEN NEXT : IFC=2 THEN SOUND15,10 : GOTO 10 : ELSE SOUND 15,0 6:GOTO 10 (if no key pressed recheck until time up. If time up and 2 displayed but no key pressed sound raspberry. If time up and 2 not displayed signal success)
120 IF C=1 THEN SOUND1,10:GOTO 10 (if key pressed before time up and 1 displayed sound raspberry)
100 SOUND200,5:PRINT TIMER (sound success, only reached if key pressed before time up and 2 displayed)
```

Life would be even simpler if the computer kept score for us. So let's add three new variables *D*, *E* and *F*, increment them for failures, successes and tries respectively, and print the status at the top of the screen after each try. Note that careful planning is needed to squeeze the whole status display on the top line and the random display is now limited to the rest of the screen.

```
20 A=RND(500):PRINT @ 0,"TRY";F;" RIGHT";E;" WRONG";D:F=F+1
60 B=RND(480)+32
110 IFA$="" THEN NEXT:IFC=2THEN SOUND15,10:D=D+1:GOTO 10:ELSE SOUND150,6:E=E+1:GOTO 10
100 IF C=1 THEN SOUND1,10:D=D+1:GOTO10
130 SOUND200,5:E=E+1:PRINT @ 0,"TIME";TIMER
```

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VIC20 cassette unit + joystick, as new £40 Tel Uxbridge 53641

VIC20 + 16K + 3K cartridge cassette unit joystick covers, £140 software £80 books £220 ono Tel 021-440 6280 after 6 pm.

VIC20, Cassette deck super expander joystick + video extension lead £170 Tel Widnes 4682

VIC20 + cassette unit, 8K Ram and games + manual £160 Tel 01-527 8681

VIC20 + cassette recorder 16K + 3K expansion units two cartridge games Much cassette software + books magazines Still under guarantee worth over £400 only £149 Tel 01 741 3361 evenings

VIC 20 CASSETTE DECK, £175 of cartridges including super expander Omega Race Jellymonsters Pihea code etc any offer over £280 Telephone 29018 834 (4 45-6 00 pm only)

VIC20 + cassette unit, + books + mags 16K £100 Progs + other at any offer Tel 0606 75115

VIC20 + 16K cassette cards super expander joystick £150 + software Introduction to Basic 1 and 2 £299 Tel 0424 216414

VIC20 16K + cassette unit, joystick covers O level cassettes £100 software £250 ono Tel 021-458 7089

VIC20 + CTN unit + super expander Star Battle Loads of software magazines + Vic Revealed £250 Tel Chorley 64461

VIC 20 + 3K data cassette joystick, super expander Adventures Ratrace Star Battle Omega + 10 cassettes + mags £300 Tel Tatsfield 050

COMMODORE PET 3032 with 2 bird drives and Commodore printer 18 months old £1 500 Tel Maidenhead (0628) 31911 evenings and weekends

VIC20, cassette deck lots of magazines books and software for £150 Write only to Sid Akhtar 1 Edward Street Werneth Oldham Lancs OL9 7QW Tel 061 633 4867

VIC20 + cassette light pen 32K Various software £200 Tel 01 789 6180

VIC20 plus cassette unit, plus 8K motherboard plus 3K super expander Forth Rom Gorf Omega base Saigon II Chess and Star Battle cartridges one joystick various books and tapes £250 ono Tel Dunfermline (0383) 734731 evenings

VIC20 + cassette recorder + Omega race + Vic Man cartridge £150 Tel 061 773 4527

16K VIC20 + cassette disc drive + Joystick, software including Program Aid Super Expander Sargon Chess + program ral guide Worth £650 sell for £400 ono Tel Shoeburyness 3084

VIC20 CASSETTE UNIT Joysticks all boxed TV set (b w) Games application manual magazines £249 ono or for MZ50K Tel Calne 866386

VIC20 + cassette deck 3K high res cartridge Jelly Monsters Space Battle Joystick £165 ono Tel 01 368 7033/1169 Mr Bridge

VIC20 + cassette + four games + chess program Learn basic + reference manual £168 Tel 061-434 8483

VIC 20, cassette deck 3K super expander high res cartridge joystick + £70 software perfect condition £180 Telephone Simon Ofton (0420) 85365

COMMODORE VIC20, 8K 3K super expander machine monitor + 20 games good condition, will separate Phone Norwich (0603) 712320 (5 pm)

VIC20 plus cassette unit 6K expander Intro to Basic Part I programs + magazines still under guarantee £195 Tel 0593 844437

VIC20 + cassette + joystick, introduction to Basic Parts 1 bno 2 Progs Reference Guide three months old £140 Tel 01-908 4911

VIC20, cassette deck, joystick, 16K Ram bno programs £220 ono Tel Dublin 01 723 5815 Ask for Mr Tyson

VIC 20 + cassette unit, Afron expansion 27K extra Ram £75 books £125 cartridges £100 cassettes as new Sell for £525 (complete) Tel 01-942 8334

CBM PET 2001 16K new Ram Cassette unit program sounds generator toolkit, manuals software good condition £250 ono Tel Leek (0538) 385906

COMMODORE PET 4032 (upgraded 3032) Including 2 Rom sets cassette books light pen reset switch (software tape or disc) £375 Tel 0302 383212 0703 830248

32K PET, 3K Ram disc pro chip cassette player Tel 01 385 6962 (after 5 30 pm)

PET 3032 + 3040 dual disc unit (April 82) £975 Tel Keith Camberley (0276) 61484

VIC20 with CZN cassette deck 3K super expander joysticks Star Battle cartridge Vic Revealed lots of software £180 Tel Coalville 38811

VIC20 cassette deck Jelly Monsters, 8K Ram joystick Superworm Hopper Alien Blitz Amok, Mars Invaders Ant Raiders Another Vic in the Wall Asteroids + 45 other games worth £350 Offers. Tel Great Dunmow 810720

VIC20 + CZN cassette deck Integer basic part 1 £50 software £160 ono Tel Ickford 687

VIC20 plus 16K with cassette unit Introduction to Basic 1 & 2 various games all less than 3 months old £220 ono Tel Sheffield (0742) 383155 evenings

VIC20 + data cassette 8K Ram joystick + lots of cassette games £140 ono Tel 01-560 3915 Andy

VIC20 + cassette unit + joystick Duplicated Prison all boxed as new £150 Tel Evenings Hornchurch Essex 44230 after 6 pm

VIC 20 +cassette unit with 8K Ram super expander cartridges including Omega Race and Star Battle — ideal 10 cassette programs including Defender Traxx and Frogger Two months old cost £380 Sell for £280 ono Tel 01 574 4122 after 4 pm

VIC20 + cassette and 4 month guarantee super expanded. Jelly Monster Sargon Chess Joystick + £30 software Programme reference guide + more books £170 ono Tel 0532-524657

VIC20 plus 16K expansion, high res Vic kit data set and £70 software Will swap for BBC micro Tel 021-704 3915

VIC20 with cassette deck, super expander Alien Voodoo Castle and Blitz. £160 ono Tel Spennymoor 817304 after 4 30 pm

VIC20 + cassette super expander Jelly monsters Lunar Lander games and tapes magazines all boxed under guarantee £180 ono Tel 0384 75387

VIC20 + cassette deck + super expander 8K Ram Sargon II Program Reserve Guide Intro to Basic Part I etc £200 Tel 041 848 6669

VIC20 + cassette unit + 16K Ram + super expander + m/c monitor + Vic Renewed + programmers reference guide + light pen + £100 of software 4 months old £350 Tel Irving 213303 6-9 pm

COMMODORE PET 32K, basic four toolkit, reset switch cassette deck and cassettes + manuals £375 ono Tel 01 748 6359 evenings

16½K VIC20 cassette recorder Adventure Rom joystick 32 programs £300 Tel Crawley 272434

COMMODORE 8K, small keyboard integral cassette £125 ono + small Trendcom Thermal Printer 40 coles £50 or £150 for both Tel 01 748 9064 evenings

VIC20, four months old complete with cassette unit joystick 8K Ram Advent cartridge Rat Race and other cassette software free Vic Revealed only £175 Tel 01-272 3316 after 7 pm

VIC20, 32K Ram on storeboard + Vickit II + Rom motherboard Adventures Adventureland Sargon II Chess. Joystick covers all fitted + eight Vic Books £560 value sell £375 Tel Kendal 58573

VIC20 CTN cassette recorder + 16K and Ram 3K MRS expander + books + much software £225 ono Tel 0553 87679

VIC20 £60 Sargon II chess Adventure Land + Omega £15 each. Tel Colnbrook 3964

VIC20, brand new 12 month guarantee super expander cartridge Vic program guide joystick cassette and various magazines £180 Tel G Johnson (after 4.30 pm)

21K VIC20 with 1515 graphic printer paper 2CN cassette recorder 13 games and utility cartridge + game tapes with paddles All worth £867 will accept £520 ono Tel Peter Erith 32102

VIC20 + cassette player + £50 software New at Christmas £175 ono Tel Macclesfield 21574

VIC20, will swap Pirate Cove for Mission Impossible Tel 0382 75795

VIC20 + 3K + £21 worth books £120 or exchange for Olympus OM2N camera Write J E Kelly 14 Hibbert Lane Marple Cheshire SK6 7NL

PET 2001 8K memory small keyboard + integral cassette dust cover books manual + lots of tapes £300 Tel 0670 827615

Ataris for sale

ATARI VCS six cartridges £100 ono Tel Runcorn (092 85) 60635

ATARI 400 + 3 games pair of joysticks, £220 ono Tel 01-802 1280 home work 01-837 4272 extn 120 Mr Lloyd Bailey

ATARI 400 16K complete with 410 cassette recorder all manuals loads of games £300 ono Telephone Horsham 58954

ATARI 400 16K, 5 months old, tape recorder, pair of joysticks basic + hand books + Airstrike Star Raiders £220 ono Tel M Shoob 01 204 9679

ATARI, VCS Combat, Space Invaders, Outlaw Pacman Video Chess, Asteroids £100 or swap for Spectrum Tel Bolton (0204) 62065

AT400 VIDEO COMPUTER system with 6 cartridges, £160 Tel 01-402 8870

ATARI VIDEO GAME with Combat etc Paddles and Mercury joystick. £125 Tel Belfast 671734 after 5 30 pm

ATARI V.C.S. with seven cartridges including Street Racer Combat Breakout Human Cannonball Asteroids Adventure and Space Invaders worth £235 want £110 Ring Andrew on Blackmore (0277) 821456 after 4 pm

ATARI VCS + five cassettes, £85 or will swap for ZX81 + 16K + money Tel 0825 811879

ATARI VIDEO CONSOLE, six games + set of keyboard controllers £110 Tel Southend (0702) 49160

ATARI 400 + 8K Key and IC board + Basic cartridge + manual + Star Raiders + joystick £300 Tel 01 570 8658

ATARI VCS bored with Combat, Joystick and paddle £70 Tel Darlington 66130

ATARI 800, 48K + basic cassette player Starraiders Crossfire, etc. Best offers to 01 571 1300 after 7 pm (Kitay)

ATARI VCS, joystick + paddles, four cartridges + rack, £70 Tel 0344 51609

ATARI VCS, PacMan + Video Chess Combat £100 ono Jack Tsouramanis. Tel 01 348 5066

ATARI VCS + seven cartridges including PacMan Space Invaders and Asteroids Will swap for Vic20 + cassette deck Tel Hattie (04248) 2879

ATARI 800 48K, recorder Basic, manuals £350 of software nine cartridges five tapes Defender Star Raiders Pacman Galaxians Joysticks only £605 ono Tel Maidstone 861827

For sale

BURROUGHS 820 – memory 128 floppy disc 1 m bite 2 cartridge disc drive 4 8 m/bite line printer 300 LPM fixed drive 38 5 on 4 platters for VDU Offers. Tel Mr Fisher 0634-44530 x219

WILL ANYBODY swap the Arcade-type Spectrum program for my J K Cregee Escape Ring 0278 563201 Tuesday or Thursday (evenings)

VIDEO GENIE 1 OR 2 with or without monitor preferably in south west, but anything considered will offer cash Tel (0272) 836771

ZX PRINTER + paper £40 £50-worth of 16K Spectrum software sell for £25 Tel 0709 546587

STAY SHARP with an MZ80K, 48K with compatible joystick and cassette 25 games including Golf Cannon Ball Island Breakout. Free delivery UK mainland £310 Tel 0942 602808 (Gloucester) evenings

UK101 + 810 BRD, 32K Ram Two x mini disc drives Sek cased 868 V31 ... basic 5 Segmon etc, B/W monitor £450 ono Tel Aldershot 28796

DRAGON 32, Joysticks, 2 months old £165 ono £67 of software for £50 boxed as new Mr Hill Swindon (0793) 770173

DRAGON 32 Berserk cartridge swap for Ghost Attack cartridge Tel Winchester 0962 54161

HOW TO PROGRAM ZX81 work cards. How to Program ZX81 training manuals How to Program ZX81 cassette £5 Simon Cannon Tel 01 554 6389

ADVENTURE GAME called Mission Asteroids 3 3 disc drive for the Apple II computer £10 McKenzie Tel Pontybodkin (0352) 770233

15 ROLLS ZX PRINTER PAPER, £25 Tel Warrington 821898 after 4 30 pm

VIC20 SOFTWARE for exchange Philips G7000 cassettes £7 50 each. Tel 01 397 8751 6 pm to 9 pm

SWAP, Vic20 upper Lander + Avenger Cart for any other Cart (Vic 20) Telephone Bolton (0204) 43064

5 ROLLS OF SINCLAIR PRINTER PAPER, untouched £6 Tel St Helens 26314

SHARP PC1212 CE1211 CE122, EA11E power adapter manuals etc £70 00 Tel Luton (0582) 593066

SINCLAIR PRINTER PAPER 10 rolls only £15 or will sell 5 for £8 Tel 01-890 6078

DRAGON 32, hardly used joysticks lots of cartridges + tapes £260 ono Tel Newcastle upon Tyne (0632) 262801 (evenings)

NASCOM II 16K fully cased and working documentation + tape recorder £300 Tel 01-485 4773

TEXAS TI99/4A + extended Basic cmdr + cassette lead £180 Tel Slough 46679

TANDY TRS80 PC1, same as Sharp PC1211 £60 ono Tel 01 202 3624

VIC20 cassette unit, £25 Software £140 Tel Telford 585184

SWAP Vic20 Adventureland, perfect condition for the Count of Voodoo Castle Tel Geoff 061 477 1414 ext 286

PHILIPS G 7000 + 10 cartridges £100 ono Tel 0834 574647

PHILIPS G7000 colour computer with six Videopaks cost £160 new unused £95 ono Tel Mastick (0629) 56771

SWAP Scott Evans adventure game for any other adventure game Tel Glossop 2674

TRS-80 III, 48K 2 disc drives, s/w 3 months old £925 ono Aagley (0562) 883544 West Midlands

TANDY TRS 80-level II VDU cassette unit £150 Tel Sidlesham Sussex 7334 after 6 pm

SHARP MZ80K, 48K Basic Forth + £100 software £220 ono Williams Sheffield (0742) 568058

VIDEO MASTER CHESS CHAMPION (6 levels of play) £25 Tel 01 207 6201

BIPAK SOUND UNIT for ZX81 £18 Tel 0792 297836

SHARP MZ80K 48K + programs £320 Tel Kings Lynn 873281

1 X SUPERBOARD II 32 x 48 screen format with case two joysticks good condition £80 Tel (0206) 49212

SHARP POCKET COMPUTER P C 1500 Also printer etc urgently wanted Ring after 6 pm 01 804 6078

SHARP MZ 80K — 48K Ram, 15 months Basic toolkit assembler machine code faulty reset switch Space Invaders Othello + many other progs £500 Tel Kings Lynn 674503 (eves)

TEXAS TI58 CALCULATOR + PC100C printer + 2 modules (maths and stat) £120 ono Noah Tel Oxford (0865) 248149

SOFTWARE for BBC B 32K Snapper Defender Monster Jumbo Invaders Pirates £10 2 Hardcastle Street, Belfast 7 NI

VIDEO GENE, unused system 48K double density twin 200K drives twin matrix printer approx £200 worth books and software cost £1 200 will accept £1 100 ono Tel 0274 577636 (eves)

SWAP VIC20 for Spectrum Tel 01 439 5047 day 01-459 2571 evenings

SWOP VIC20 AVENGER Cartridge for Pirate Cove etc. Tel Kirkcaldy 0592 261660

TRS 80 LEVEL II, 16K with CTR 80A recorder £80 of software including Sound Generation programs + supporting hardware worth over £320 sell for £170 Tel (045382) 2736

TEXAS TI 59 programmable calculator £60 Also P C — 100c Printer £95 Also used Engineering module £20 unused supplies in original boxes Tel St Albans 32069 or Fm bourne 596

VIC 16K Ram cartridge £45 Tel 0703 775680

ROWTRON TV game and 6 cassettes £100 ono Potters Bar 50498

48K TRS 80 with lower case Alien joystick stick stand all leads, books and manual good condition £300 Tel 05827 54653

9in B/W TELEVISION (no sound) suitable for ZX81 £5 Tel Stevenage (0438) 811834 after 6 pm (buyer collects)

Wanted

WANTED Cassette unit for Vic20 Tel 0286 78421

WANTED BBC Model B Tel Hull 849517

WANTED VIC 20 cartridge Amega race or Gorf £15-£20 Tel Ampthill (0525) 402049 (5 pm)

COMMODORE PROGRAMS ref guide Tel Amit 01-886 0510

YOUR COMPUTER February edition Vol 2 No 2 plus Vol 1 No 5 Will pay P&P Tel Richard Sharod, Bracknell 26320

WANTED Commodore machine language monitor cartridge in exchange for super expander cartridge Tel Amit 01-886 0510

WANTED Sharp MZ80K or Vic20 plus 16K Ram and printer Tel Wigan (0942) 55980

WANTED Two disc drives for TRS80 Model I Level II Tel Office hours 01-848 1704 evenings 01 445 1404

WANTED ZX Spectrum 16K £100 ono Sussex area Tel Newhaven 6458

WANTED COMMODORE VIC20 tape unit must be in good condition Tel 01-880 3038 evenings

WANTED Cassette unit for Vic20 Tel 0286 78421

WANTED second hand TRS80 model one preferably with expansion interface + disc drives Tel W Ellington 01 353 6723 days, or 01 794 3330 evenings

PEEK & POKE



BRIDGED BY AN INTERFACE

Jill Edwards of Brookdene Avenue, Oxhey, Hertfordshire, writes

Q **I have just bought a BBC model B microcomputer, after using a Spectrum and ZX printer for some months. I would like to know if it is possible to use the BBC with the ZX printer. If so, where can I get the interface?**

A The company that sells interfaces for use with the Sinclair printer is Microtanic Software. The address is, 235 Friern Road, Dulwich, London.

MAKING SENSE FROM NONSENSE

R E Martin of Clock Face Road, St Helens, Merseyside, writes

Q **I have had a 16K Spectrum for a few weeks now and I am very pleased with it. However, there is something that is causing me concern.**

If I use a *Read* statement, *Read* (String Variable) and a *Read* (Numeric Variable) in the same program, the error message 'C' — Nonsense In Basic comes up when the program is *Run*.

Here is an example

```
10 READ a
20 READ a$
30 PRINT a$: PRINT a
40 DATA "bug"
50 DATA 10
```

It seems as though the *Data* statements have to be in the right order when using String and Numeric variables. This is not mentioned in the manual. Is this a bug?

A The first *Read* statement in a Spectrum will always *Read* the first *Data* statement that it comes to. The second *Read* and second *Data* item and so on. This must always be kept in mind when using *Read*/*Data* commands.

In the example that you give the first *Read* variable is 'a'. This can only apply to a numeric variable. Your first *Data* statement is 'bug'. This can only be a value assigned to a string variable. So the reason that you get 'NONSENSE IN BASIC' is because you are trying to assign a numeric variable to a String name, and a String variable to a Numeric one.

Assuming that your *Read*/*Data* statements are in the right order then a line like *Print A$: Print A* is quite allowable.

CROSSING THE DIVIDE

N D E Alexander of Rogerson West House, Merchiston Castle School, Colinton Road, Edinburgh writes

Q **I am a Sixth Former studying Maths, Physics and Chemistry 'A'-levels. I am wondering about buying a programmable calculator/pocket computer (ie portable). Please could you advise me as to whether this is a good idea and what sort of model you would recommend (not over £100). Are there any magazines dealing specifically with pocket calculators?**

A You are approaching an area where calculators merge into computers. Even if you keep the price below £100, this still includes the ZX81 for £50 and the Oric for £99.95. However, neither of these is truly portable.

I suggest that you look at the Casio PB100 which costs £59.95. This has 544 programmable steps in 10 areas.

If you want to go up into the £100 area, then you have the Hewlett Packard 15c and 16c. The 15c is just below the £100 mark while the 16c is a little over. On the other hand, you might like to try and get a second hand TI59 or HP11c.

Unless you want a specialist calculator then I would suggest you look at the Casio PB100.

I do not know of any magazine specifically dedicated to programmable and portable calculators. But, Tempus deals in this field and might be able to help you. Tempus is based at 38 Burleigh Street, Cambridge CB1 1DG.

MISINTERPRETED BY TELEPHONE

M J Robinson of Barkham Ride, Wokingham writes

Q **Is there any way that I could send a program down the phone from my Spectrum.**

I have tried the direct way with the volume high and it does create some response on my brother's Spectrum at the other end.

A You need a modem. This stands for a Modulator/Demodulator and it converts the output of the computer into an audio signal. This is necessary because the telephone switching system cannot handle the normal DC output of the computer, as it interferes with the relay system at the exchange.

Without a modem there is liable to be a misinterpretation of the signal which will return wrong numbers. In fact even with a modem, some telephone lines can be so bad that a program will corrupt. This should start to change over the next few years if fibre-optic cable systems catch on. These should offer a much cleaner path for computer signals.

FROM OVER THE ATLANTIC

H Lunn of Allerton Grange Way, Leeds, writes

Q **I own a TI99/4a computer. Could you please tell me whether I need to spend £66 on the extended Basic cartridge, to be able to program Space Invaders etc?**

I would also like to know whether the magazine *99'er* can be bought in this country. I have asked in several major bookshops, but they have not heard of it.

A It is up to you whether or not you buy the extended Basic cartridge. It will supply many of the Boolean functions such as *If Then Else Or Not*. It will also aid your control of sprites, and a disc system, which I would have thought would be very useful when writing games programs.

The magazine 99'er can be bought direct from America, but it is also going to be available over here. As of February it will be available to members of TIhome.

TIhome is the TI users group in this country. It has its own magazine which is published six times a year and costs £12. You might find this a good place to look for further details about the whole TI99/4a system. For further information contact Paul Dicks, TIhome, 157 Bishopsford Road, Morden, Surrey.

FIGURING OUT FREE BYTES

Robert Smart of Griffin & George (educational distributors for the Spectrum) has written to me with a much easier way of working out the number of free bytes in a program. It works on both 16K and 48K Spectrums. It is *Print 65536 – Usr 7962*. If used before the program is Run, it will not take into account the area used by the variables.

Bill Longley of 388 Ipswich Road, Colchester, CO4 4EX, has written to say that he can offer a list of tips for the Spectrum to anyone who writes and encloses an SAE or 20p-worth of stamps.

To end, I would like to thank the person who sent me a copy of *Laserbug* Issue 5, October 1982. This issue contains a review of the GP100 that I mentioned a few weeks ago. This issue also has a screen dump for the GP100, and advice on how to stop the stretching effect when the picture is transferred. *Laserbug* is at 10 Dawley Ride, Colnbrook, Slough, Berks SL3 0QH. Back issues are still available and they cost £1.25 including postage.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF



Ziggurat

After Descartes

Discussion about artifical intelligence (AI) can be traced to an article by Alan Turing *Computing Machinery and Intelligence* in *Mind* 1951)

Turing was trying to define what was intelligence *in practice* He thought that if a hidden machine could fool us into believing it was human then it was human This was the 'Turing Test'

AI attempts to copy human-like intelligence, hoping to make computers more useful and also to understand the principles which make intelligence possible A central feature of AI is the formulation of theories and models designed to show how the varying aspects of intelligence are possible

As with any subject there is dissent about its exact nature There are those who believe that a truly intelligent machine is possible for example F H George in *Man the Machine* 1979 Many in AI tend to agree though not many are as extreme as Frank George

Some of the critics of AI take the position that there is something qualitatively different between man and machine just as there is a qualitative difference between man and animal J R Lucas *(Freedom of the Will* 1970) points out that a computer is rule-bound and notes we, being rational can get the hang of ideas without any rule being given us just as we can recognise the truth of a proposition although it cannot be proven within the given [rules of logic]

A recent development of AI, into Expert Systems (a partially intelligent system with a source of information upon which the intelligence is exercised) is of great interest

The system is called expert because it tries to emulate the workings of an expert in some area (drilling oil wells monitoring patients etc) Many expert systems were at work in the Falklands conflict directing missiles and such like

Expert systems were themselves under attack after the conflict because of what were seen to be their shortcomings It is thought that the HMS Sheffield was sunk because an expert system on board failed to respond to an attacking Exocet The system on board had been told that Exocet was a friendly missile because we also use Exocets Reportly those trying to find out what actually went wrong couldn't understand how the expert system could be so stupid

Recently there have appeared several computer games which claim to use AI techniques — for instance versions of the game *Othello* chess games and the new adventure game based upon Tolkien's book *The Hobbit* What do such claims actually mean? In games like Chess the tactics (pins forks or skewers) can be easil covered by computer programs The difficulty comes in organising the tactics and the moves the strategy which places one in a position where there is a tactical advantage

Theoretically a human player who is able to appreciate strategy should always beat a computer because a computer usually only tries to maximise short-term advantage — it will nearly always take a gambit pawn The truth of the matter is however that computers win more than they should because human players are not as good as they think they are

AI programs use what is termed fuzzy logic choosing the most likely alternative (in statistics called the maximum likelihood solution)

AI programs using fuzzy logic follow Descartes dictum If in doubt choose the most likely option, and then believe you have made the correct decision ∎

Boris Allen

Puzzle

Up the pole

Puzzle No 43

The Third Lower Muddlecombe Scout Troop camp has two flagpoles each fifty feet high standing on level ground seventy five feet apart A single rope 160 feet in length has its ends attached to the top of both flagpoles and has been pulled taut with a peg hammered into the ground — as shown in the illustration

How far is the peg from the nearest flagpole — assuming the poles and peg lie in a straight line?

Solution to Puzzle No 39

No — chopping its head off and counting the rings is not the correct way to approach this problem! The following program gives a display of possible solutions

```
10 FOR J=17 TO 400
20 GOSUB 100
30 NEXT J
100 FOR F=1 TO 300
110 IF (J-F)*(J-F) - (J*F+1) = 0 THEN PRINT J, F
120 IF F > = J THEN RETURN
130 NEXT F
140 RETURN
```

This gives pairs of values (J F) of 21,8, 55,21, 114 55 and 377,144

If it is assumed that a Giant South American Tortoise does not live to age 377 then the second highest solution is José is 55 years old and Felipe is 21 year old

Winner of Puzzle No 39

The winner is J A Brice Wickham Road Colchester Essex who receives £10 ∎

Top 10

Atari

1 (1) Air Strike (English Software)
2 (—) Miner 2049er (Big Five)
3 (5) Preppie (Adventure International)
4 (—) Snooker and Billiards (Thorn EMI)
5 (—) Hellcat Ace (Microprose)†
6 (4) Star Raiders (Atari)
7 (—) Espial (Adventure International)
8 (—) Threshold (On Line Systems)†
9 (—) Sunday Golf (Adventure International)
10 (—) Sea Dragon (Adventure International)

Cartridge †48K disc

Figures compiled by Calisto Computers Birmingham (021-632 6458)

Spectrum

1 (2) Penetrator (Melbourne House)
2 (1) The Hobbit (Melbourne House)
3 (4) Time Gate (Quicksilva)
4 (—) Hellfast Goes Skiing (Psion/Melbourne House)
5 (7) Arcadia (Imagine)
6 (9) 3D Tanx (DK Tronics)
7 (—) Spectrum Chess (Artic)*
8 (3) Flight Simulation (Psion)
9 (5) Football Manager (Addictive Games)*
10 (—) Spectral Invaders (Bug-Byte)

Requires 48K

(Figures compiled by Buffer Micro Shop London 01 769 2887)

Vic20

1 (6) Frog (Interceptor Micros)
2 (10) Alien Attack (Interceptor Micros)
3 (1) Andes Attack (Llamasoft)†
4 (8) Abductor (Llamasoft)
5 (—) Traxx (Llamasoft)†
6 (—) Vic Rescue (Interceptor Micros)
7 (2) Gort (Commodore)
8 (8) Scramble (Rabbit)
9 (—) Penny Slot (Interceptor Micros)
10 (5) Grid Runner (Llamasoft)

*Cartridge †Requires 8K or 16K

(Figures compiled by the Vic Centre London 01 992 5855)

ZX81

1 (2) Flight Simulation (Psion)
2 (3) 3D Defender (JK Greye)
3 (—) Frogger (DJL Software)
4 (4) Gulp I (Campbell Systems)
5 (1) King Kong (Tony Barber)
6 (—) Mazogs (Bug Byte)
7 (5) Football Manager (Addictive Games)
8 (10) Sea War (Panda)
9 (—) The Fast One (Campbell Systems)
10 (—) Pimania (Automata)

All 16K

(Figures compiled by Buffer Micro Shop London 01 769 2887)

Books

1 (2) Spectrum Machine Language for the Absolute Beginner *Tang* (Melbourne House)
2 (3) Creative Graphics on the BBC Micro *Cownie* (Acornsoft)
3 (—) Compute!'s First Book of Vic various authors (Compute)
4 (1) Assembly Language Programming for the BBC Micro *Birnbaum* (Macmillan)
5 (—) Forty Best Machine-Code Routines for Your Spectrum, *Hardman* (Hewson)
6 (5) Programming the 6502 *Zaks* (Sybex)
7 (6) Understanding Your Spectrum *Logan* (Melbourne House)
8 (7) Z80 Assembly Language Programming *Leventhal* (Osborne)
9 (—) Mastering the Vic20 *Jones* (Horwood)
10 (8) Graphs and Charts on the BBC Micro *Harding* (Acornsoft)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

(Last week's position in brackets)



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